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Index to Volume XLI.

JULY — SEPTEMBER, 1893.

ILLUSTRATIONS.

[*The figures refer to the number of the journal, not to the page.*]

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THE AMERICAN ARCHITECT AND BUILDING NEWS.

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JULY 1, 1893.

CONTENTS

THE *Deutsche Bauzeitung* has a correspondent, apparently one of its editors, at the Chicago Exposition, and his letters, conveying the impressions of an expert, are very interesting. Arriving in Chicago at the opening of the Fair, he found, like every one else, the exhibition very incomplete, and he makes some rather severe criticisms upon the "gross deception" practised on the public by inviting visitors to inspect exhibits which remained still in their packing-cases. "In no department of technical art," he says, "could a visitor attempt systematic study without bitter disappointment." Fortunately, things have very much changed for the better since the letter was written. For Chicago itself, the correspondent has few compliments. Situated, as he says, on the flat, monotonous shore of Lake Michigan, it presents little architectural interest. In the centre of the town is a collection of large buildings seven or eight stories high, with here and there a "sky-scraper" of fifteen or twenty stories, cutting off light and air from the neighboring estates; but the remainder of the immense area covered by the city is occupied by interminably long, straight, flat streets, lined for miles with little one and two story houses, mostly of wood, in the midst of which, rarely, a group of better houses may be seen, "like an oasis in the desert." Even Jackson Park the visitor finds naturally flat and uninteresting, but treated with consummate art by the landscape-gardeners, who, availing themselves of the unlimited water-supply at hand, have produced charming effects.

LA CONSTRUCTION MODERNE has also its representative at the Fair, and the French view of the show is, in its way, as interesting as that of the German architect. Like the German, the Parisian expert finds matters in a state of confusion which seems to him hopeless. In other countries, order might at last be brought out of the chaos of bales, boxes and bundles scattered about everywhere, but he thinks that the American, as an individual, has too much initiative, or "go-ahead," to work successfully in harmony or subordination with others, and that the independent efforts going on there, however energetic, will not converge to final unity. The history of the administration of the Fair gives a little color to this observation, but in the several departments there seems to be no lack of subordination, and no reason for fearing that the necessary confusion of the opening will prove permanent. The French architect, however, finds more serious things to say. To his mind, the Fair has too much the air of a gigantic and audacious speculation. Without dwelling upon the colossal profits which the hotel-keepers, servants and bootblacks seem to be intent upon extracting from the "unhappy visitor," and with which, of course, the Administration of the Fair has nothing to do, he mentions something for which the Administration is responsible, and which he has reason to disapprove. According to him, the original invitation sent to manufacturers to induce them to contribute exhibits said that "motive power in sufficient quantity would be furnished gratuitously." After the exhibitors had got their machines set up ready for the opening of the Fair, they were informed by another circular that all those who wished to have the machines exhibited by them shown in operation must pay for power, at a fixed price, which was, to say the least, remunerative to those furnishing the power. Even the American exhibitors protested against this attempt to ignore, not only the precedent of other expositions, but the explicit promise made to the exhibitors, and the Directors took the matter under advisement. Finally, they devised what the Parisian expert calls "a funny dodge" — "*le biais le plus plaisant du monde*." They gave notice that they would fulfil their promise to furnish gratuitously "motive power in sufficient quantity" to each exhibitor who desired it, according to their original circular; but they called attention to the fact that this circular did not say how long the power would be furnished, and announced that the gratuitous supply, while sufficient in quantity to move the machines, as agreed, would be furnished for only a few minutes each day, and that those persons who wanted it at other times must pay for it at regular rates. It is understood, of course, that we give this story entirely on the responsibility of the correspondent of *La Construction Moderne*, who mildly adds that the recollection of the circumstance is not likely to develop great enthusiasm among foreign manufacturers on the occasion of future expositions in America.

TWO of the most distinguished archæologists of our time died recently, within a few days of each other. Of these, the best known in this country was Mr. Gaston Feuardent, who had been a resident of this country for about sixteen years. Mr. Feuardent was himself the son of a distinguished antiquarian, and dealer in coins and works of ancient art, and, when a young man, represented his father's firm in London. On coming to this country, he went into business on his own account, and soon found his skill and learning appreciated. Some ten or twelve years ago, he was led to make some severe criticisms of the Cesnola collection at the Metropolitan Museum. The newspapers took up the matter, and developed it into an exciting quarrel, with accompaniments of bluster and recrimination very unsuitable to the occasion. As no one else here could pretend to the knowledge necessary to determine between the parties to the controversy, no one was convinced on either side, and probably no one ever will be. The effect, however, was to subtract the partisans of General Cesnola from Mr. Feuardent's customers, to the serious injury of his business. His health seems also to have been impaired by the annoyances and anxieties of the time, and he had been an invalid for a long time preceding his death. The other archæologist whose death we have to mourn is M. Alfred Darcel, the learned curator of the Cluny Museum in Paris. M. Darcel, like Feuardent, was a Norman, having been born at Rouen in 1818. In 1841 he entered the École Centrale des Arts et Manufactures, in Paris, receiving his diploma as engineer in due course, and, on his return to Rouen, he undertook the direction of a manufactory of chemicals. He was, however, very fond of archæology and the arts, and, after some years among his chemicals, he obtained an appointment under the Ministry of Fine Arts as attaché to the "service des expositions." From this he was transferred to the Louvre, where, soon afterwards, he was put in charge of the department of the Middle Ages and the Renaissance. In 1871, he was selected as manager of the Government tapestry-works the Gobelins, and distinguished himself greatly in that position by his taste and learning, as well as his technical knowledge of dyes and processes. On the death of the younger du Sommerard, who had been for many years curator of the splendid collection which his father formed and gave to the public, M. Darcel was chosen to fill his place, and continued in the discharge of this

important duty until his death, which took place in the beautiful museum, in the midst of those treasures of mediæval art which he loved so well.

WE regret sincerely to be obliged to announce the death of Mr. P. P. Furber, of St. Louis, one of the best known and most popular of all the Western architects. Mr. Furber was for a long time associated in their Western work with Messrs. Peabody & Stearns, of Boston. He had been for some years prominent in professional matters, and was, at the time of his death, a member of the Board of Trustees of the American Institute of Architects.

WE think it only fair to enter a protest against the spiteful and absurd paragraphs which are circulating through the newspapers in regard to Colonel Ainsworth, the head of the Bureau employing the clerks killed in the Ford's Theatre accident. That the jury should have held him for manslaughter is quite enough, without filling columns of Associated Press reports with material gathered, apparently, from discharged clerks and disappointed contractors. The jury probably understood the evidence better than we can, but we have seen no indication that Colonel Ainsworth assumed any control over the contractor in regard to securing the foundations during excavation, or pretended to any special knowledge on the subject of construction; and to charge a physician with manslaughter simply because he orders an electric-light service put into a house is, to say the least, a novelty in jurisprudence.

THE circular of information, published in another column, which has just been issued by the Secretary of the American Institute of Architects shows how a little properly directed and energetic work may avert a threatened disaster and secure in its place a gratifying success. Up to this time the chance that the proposed Congress of Architects in Chicago next month would be a success appeared to be very remote, thanks to a want of aptitude, perhaps, on the part of those selected to perfect the necessary arrangements, and thanks, no less, to the passive disapproval and the active hostility excited in certain quarters by the method, or rather want of method, in which the promoters of the Congress were trying to give affect to their intentions. The new circular gives encouraging assurance that though the American Institute of Architects had been treated by the officials of the Congress as a negligible quantity its own officers are taking steps that its convention proceedings, which transpire contemporaneously with the Congress, shall be of satisfactory and noteworthy character.

HERR HENRICI, in further explanation of the fatiguing effect of streets, referred to last week, says that simply to curve a street has not the effect of making it seem shorter and more interesting, as is often expected. Although the concave side is more completely visible to the traveller than even one side of a straight street, and therefore seems shorter, a considerable portion of the convex side is hidden from him, and produces fatigue as it becomes unexpectedly visible, so that two opposite effects balance each other, and a curved street of a given length, with parallel, or rather concentric sides, seems no shorter than a straight one of the same length. It is otherwise, however, if the sides are not concentric. If, for example, one side has a concave curve, and the other is straight, the straight side presents the normal apparent length, while the curved side seems shorter than it really is, so that the total effect is to shorten the apparent length; and the same effect is produced, in a less degree, where the side opposite the concave one, instead of being straight, is laid out on a curve of a longer radius than the concave side. The same principle is applicable to the designing of squares and open places along the line of a street. The worst form of all is a simple rectangular expansion, which interrupts and unexpectedly lengthens the vista, and increases the feeling of fatigue. A better form, if rectangles are obligatory, is a rectangle at one side of the street only, the other side continuing its course without a break, so as to lead the eye agreeably past the interruption. If this disposition cannot be secured, and a rectangle astride the roadway is the existing or necessary form, it is of great advantage to set lines of trees, or even rows of lampposts, to continue the lines of the house-fronts across the space, and give the eye the means of measuring the distance which seems to be necessary to its comfort.

THE best shape of all for such open spaces is, however, an oval, formed by two concave curves, which should be arcs of circles. Here the disagreeable element of unexpected interruption is reduced to its lowest point; while the pleasant features of space, verdure and, perhaps, artistic interest are retained. Where importance is to be given to public buildings by placing them on a space wider than an ordinary street, these principles make it evident that the best arrangement is to widen the street on one side, by a concave curve, in the middle of which is the building or monument to be honored. By doing so, the building is made visible for a long distance in either direction, at the same time that its dignity is enhanced by the open space in front of it; while the ordinary practice, of interrupting the street by a rectangular enlargement placed across it, and setting the public building for whose benefit it is destined in the middle of one side of the square, has the result of hiding the structure behind the angles of the square, and destroying the charm of distant view, and gradual approach, which it is so desirable to retain. Herr Henrici says, with truth, that most existing buildings of interest stand either directly on the street line, or on irregular spaces, formed by accident, but conforming pretty closely to the principles he has laid down; but a fashion has set in of laying out whole cities, or quarters of cities, at once, and if the rectangular and symmetrical plans devised for the purpose are carried out, and the public buildings of the future set in the places provided for them, our descendants will have cause to regret the mean, slinking effect which their principal structures will have, as compared with the unstudied, but picturesque disposition of the old ones.

A NEW athletic sport has been invented in France, and has become so fashionable that scientific men have begun to make it an object of serious study. The new sport consists in carrying a load, in the shape of a bag of flour, or of sand, weighing generally a hundred kilograms, or about two hundred and fifty pounds, over a given distance. The heroes of these exercises are generally market-porters, who, from the leather jacket, or "*coltin*," which they wear, go under the name of "*coltineurs*," and the contests in which they take part are known as "*courses de coltineurs*." The first coltineur race recorded in history was undertaken about fifty years ago, by a market porter, who made a bet that he would carry a bag of flour, weighing four hundred pounds, from Paris to Corbeil, a distance of eighteen miles. Unfortunately for him and his bet, the day was hot, and he became thirsty. Passing through the village of Ivry, thirteen miles from Paris on the way to Corbeil, he was tempted with some cool water. He drank and fell dead in the road. Since the time of this enthusiast, the weight of the loads carried in "*coltineur*" races has been reduced, but the length of the course has been increased. After a match race from Paris to Rheims, a distance of more than a hundred miles, one was undertaken on a wager from Paris to Havre, one hundred and thirty-four miles; and now a match is talked of from Paris to Bordeaux, a distance of more than three hundred miles. Novelties get extensively talked about in France, and the Committee of the Ethnographic Exhibition immediately conceived the idea of utilizing the new fashion for scientific purposes by instituting a series of "coltineur" contests between men of different races, so as to see which race would show the greatest strength and endurance. M. de Nansouty, the brilliant editor of *Le Génie Civil*, deplores such contests, with reason, as showing only abnormal development, instead of affording proper tests of the strength of different races of men, and, as participation in one of them usually cripples a man for life, he thinks that they need repression, rather than encouragement. In regard to the question, however, whether white men, Arabs, Indians or negroes possess the greatest physical force, it would certainly be interesting to have some careful trials made. It is commonly supposed that white men surpass, physically, all others, and it will be remembered that the Zuñi Indians, on being taken to see the college boys exercising at the Harvard gymnasium, came to the conclusion that the gods must help the gymnasts, for no one could execute such feats without supernatural assistance; but some of the negroes are said to possess enormous strength, and as, even in these days, physical vigor counts for a good deal in determining the destiny of a race, it may be well to know into whose hands the empire of the world will pass when those of the Caucasian get too feeble to hold it.

COMMEMORATIVE MONUMENTS.[1] — VI.

Fig. 37. Monument to General Chanzy, high relief.

THE monument to General Chanzy, at Le Mans (Fig. 37), is notable for the disposition of the figures about the pedestal. We give the following extract from an article in the *Voix des Ardennes* for May 14, 1885, signed "A. C." "M. Croisy has conceived here a sort of heroic round, the participants in which are fighting, falling and dying in an extraordinary vibration of movement. There are fourteen life-size figures, soldiers of the line, marines, artillery-men, infantry-men, cavalry-men and officers, all of whom seem urged on by a common impulse, that of courage, and animated by the same spirit, that of devotion to the Fatherland!" The *Journal des Débats* of June 5 speaks thus of the work: "Some of the figures assume a passionate and dramatic character, and are of the finest conception; the composition, which is correct and especially remarkable for its frankness, its life, animation and movement, is perfectly suited to the subject." M. Noullens in the *Presse* of May 6, concludes as follows: "Since 1870 no painting or poem has been produced which more nobly commemorates the ill-starred heroism of France, than does this patriotic group." The statue of the general is by M. Crauck; it is three metres in height. The architectural portion comprises four blocks of granite. Total cost, 140,000 francs.

[1] From the French of L. C. Boileau fils, in Planat's *Encyclopédie de l'Architecture et de la Construction*. Continued from No. 913, page 194.

Fig. 38. Monument to Gambetta, Paris.

Gambetta's Monument, Place du Carrousel, Paris (Figs. 38, 39), was inaugurated July 13, 1888. The composition of the *ensemble* and the architecture are by M. Boileau *fils*, the author of the present article. It will readily be seen that he would not care to discuss the merits of his own work, but he may be permitted to call attention to the superior talent of the statuary, M. Aubé, his associate and collaborator. All of this artist's figures possess an excellent decorative character; they are modelled with a living modern feeling; the group is thrown upon the pylon with great boldness and spirit. The hero himself appears in wonderful harmony with all the secondary figures, — with the young man picking up a weapon, the wounded soldier whom he is protecting, as well as with the citizen preparing to set off for the combat, and the Genius of the country, from whom the orator is gathering inspiration: it would be impossible to condense the national defence, of which Gambetta was the soul, into a more expressive and more noble piece of statuary. Worthy of study also are the statues of Strength and Truth, seated in varied and successful attitudes, also the children clasping hands on the façade toward the garden, whose heads are modelled in an extraordinarily delicate fashion, and the group of "Democracy Triumphant."

The group against the pylon is in stone, all the other figures are of bronze. The following dimensions are of interest: the Gambetta and each of the other figures, 3m. 60; the group as a whole, 7m. 20; the allegorical statues at the sides, 3m. 40, seated; the decorative figures of children holding shields, on the main façade, and those on the façade toward the gardens representing the army fraternizing with labor, 2m. 30; the "Democracy Triumphant," consisting of a figure of the Republic unarmed, borne by a winged-lion symbolizing the free people, 4m. 08 in all. Total height of the monument, 22m. 70; width at the base, 11m. 60 by 9m. 35; size of the platform, measured on the outside of the third step, 22 metres by 22 metres.

The lateral façades of the pylon are covered with inscriptions cut in the stone, to wit: on the right, portions of Gambetta's speech to the youth in the schools; on the left the Cherbourg speech; on the principal face above the group, the proclamation to the French after the surrender of Metz and, on the remaining face, above the trophy, quotations from the speech at Grenoble.

The faces of the banquettes supporting the allegorical figures emblematic of the dominant qualities of an orator, are decorated with a chain of cartouches on which are inscribed the dates of the great tribune's principal speeches and the names of the places where

they were delivered. The black marble slab beneath the group bears the dedicatory inscription; the one on the rear façade has an inscription giving the facts concerning the national subscription which was opened after Gambetta's death for a monument to his memory.

The front of the capital of the pyramid is embellished with a shield with the lictor's fasces and a crown of oak leaves, and

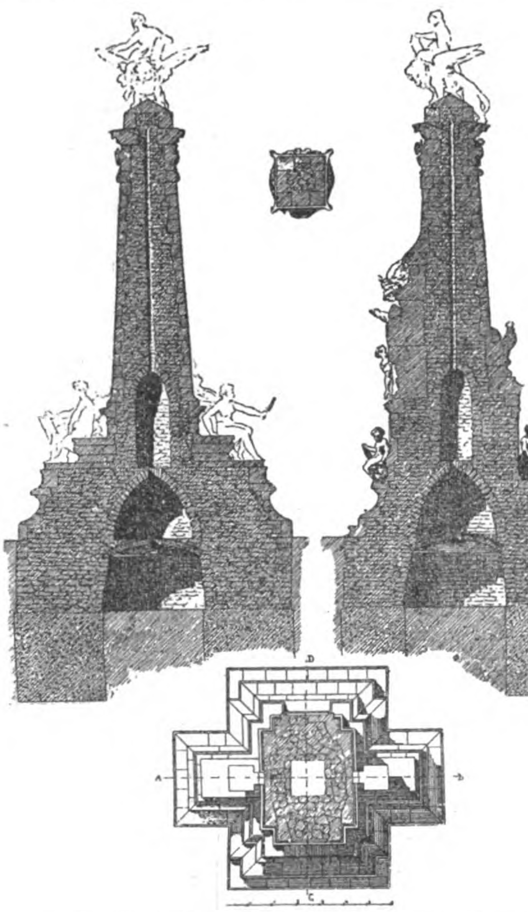


Fig. 39. Sections of the Gambetta Monument, Paris.

the monogram of the Republic; on the other faces are small tablets bearing in gilt letters the words of the device of the Republic: Liberty, Equality, Fraternity. Each of these slabs is surmounted by a cathetal motive in the abacus: a Phrygian cap, a level, and the heads of two children kissing each each other to symbolize Fraternity.

The platform is raised three steps, it is of granite, bordered with Comblanchien and black marble; the steps are also of Comblanchien stone.

As solid ground for the foundations was 6m. 90 below the surface, a course of concrete 3m. 10 in depth was laid with a mass of rough stone above; the filling of the monument is also in rough-stone work, with a vaulted cellar at the base to diminish the volume of the masonry. The stone revetting — yellow Echaillon up to the banquettes of the allegorical figures on the sides, white Echaillon above — is in courses from 45 to 50 centimetres in depth with a mean thickness of 25 to 40 centimetres, *au nu.* The mean thickness, obtained by dividing the entire volume of the stone employed, by the superficial contents of the visible faces, is 52 centimetres. The carvings and finishings count for 3m. 575 in each metre of the surfaces thus developed.

These two facts it seems to us would enable one easily to estimate the cost of a similar work; all that would be required would be to develop the surfaces of the monument reduced to right planes, without taking account of the projections of the mouldings, apply to the result the regular price of the stone to be used and that of the unit of cutting, both multiplied by 3m. 60 in round numbers. In the case in question, the superficial metre of the revettings in yellow and white Echaillon, together with the furnishings of the smooth faces and the mouldings, including also anchors and cramping-irons, came to 200 francs. The rough stone filling and the foundations, with the terrace, amounted to a third of the total cost of the finished stone. The platform — granite, marble, borders and steps, including preparatory works in concrete, cost 53 francs per square metre; this item may often be of help in making estimates.

It is evident that the stone statues cannot be included in these valuations; their price must be calculated separately, according to the kind of blocks which they may demand. In the Gambetta Monument, the group against the pyramid has, as we have said, a height of 7m. 20, with a maximum thickness of 2m. 30, including the part engaged in the pyramid, and a breadth of 4m. 50. It required seven blocks, each cubing in the mean four metres after they had been partially hewn in the quarry to diminish the weight and transportation charges. It cost, when in place, roughly shaped, 20,000 francs.

The following are the exact figures of the cost:

Terrace and strengthening of ground..........	4,736.15	francs.
Concrete of the foundations in cement-mortar; rough stone and cement....................	22,952.33	"
Yellow Echaillon, white Echaillon; irons and dowels....................................	46,470.60	"
Carvings and finishings.......................	17,652.86	"
White Echaillon for the group, including models, special scaffoldings and housing for the statuary................................	25,412.85	"
Paving and steps of the platform.............	17,807.50	"
Incidental expenses, including fencing, water, lighting, guarding, removing the stone-chippings from the statuary................	2,397.40	"
Full-sized models of the architecture, to model the statues resting against it................	5,011.91	"
Execution of the group and model............	42,000.00	"
Six statues and a bronze group, execution and models....................................	110,905.00	"
Ornament motives in stone, trophy and children's heads..............................	24,479.70	"
Bronze wreath, execution and model...........	7,000.00	"
Marble tablets, including gilt lettering.........	2,061.50	"
Engraving of letters in the stone (2,466)........	4,432.20	"
Honoraria of the architect....................	16,680.00	"
Total........	350,000.00	"

The contractors for the masonry and freestone were MM. Mourichon and Lemoüé; the ornament-worker, J. A. Boileau *frère;* the marble-worker, Séguin; caster, Barbedienne.

We are indebted to the courtesy of MM. Mercié and Falguières, statuaries, the designers, and to M. Pujol who did the architectural part, for the very interesting sketch of the monument to Admiral Courbet, at Abbeville (Somme) exhibited in Figure 40.

Even the composition of the construction is most original. Nothing better could be conceived for a commemorative monument to an admiral than the idea of representing him on board ship. The great difficulty, from an artistic standpoint, was to make the pedestal a ship, and hence the necessity of finding a wholly new and peculiarly expressive sculptural arrangement. The designers have succeeded admirably. The *ensemble* will present a most pleasing silhouette.

In view of the great talent of the statuaries, its execution in white marble cannot fail to add to the general value of the composition; without question it will be a work of art of extraordinary merit in all respects.

One word now as to the construction. The socle, that is, the ship and the water, is in blocks, laid as in a wall, and thick enough to leave thirty or forty centimetres of solid marble in the most deeply carved portions. The remainder of the mass back of the marble will be in concrete. The allegorical figures representing "Colonization" and "Tonquin subjugated" must be cut in the part of the ship where they are introduced. The pedestal proper of the statue of the hero is of solid marble; the statue itself and the accompanying Victory will be cut from one block. Especially interesting to architects are the forms of the ship, its prow and stern, and the plan of the pedestal.

Fig. 40. Monument to Admiral Courbet, at Abbeville.

In closing we desire to call attention to a certain detail of decorative monuments adorned with statuary. In former times plinths were never attached to the statues. In the Louis XIV of the Place des Victoires and the Henri IV of the Pont-Neuf, in the Colleoni statue at Venice, and twenty others besides, the horses are placed directly on the marble pedestal. In Saint Peter's at Rome, the allegorical figures embellishing the

remarkable tombs in the chapels never have plinths, and we are speaking here, let it be noted, not only of those in bronze, but also of those in marble. In all these we find statues resting their white marble feet on a sarcophagus in black marble or on a pedestal in Sienna yellow. The sculptors of that time were right.

The figure of the hero may be shown in a place prepared especially for it and isolated on a pedestal that bears it only; in a word, it may be conceived as a whole, complete, apart from the socle on which it is exposed. In this case it is not necessary that the figure be attached to a plinth of the same material, but at the same time there is no disadvantage in it; but if the pedestal be decorated with accessory figures, why require that each be treated in its turn like the hero? Adopting such a course, the artist might indeed, with a quantity of statues, produce something resembling an exhibition of works of art on an *étagère*, but he would never succeed in giving the impression of a whole conceived as such.

The plinth is the negation of the decorative principle. It is a false point of departure which gives a wrong turn to the entire composition. The figure with the plinth *bears* necessarily, as we say at the École, on its marble or bronze square; it is conceived apart from the construction, it is not free to settle itself, to sit down, to recline on the rigid forms about it; it cannot then be decorative of an architectural *ensemble*.

The sculptors of the first half of this century had entirely lost the feeling of the brilliant art of the seventeenth and eighteenth centuries; they knew only how to chisel for the *Salon*. The statue was for them an *objet d'art* which the State was to buy to place in some provincial museum. It was what we might term ready-made art; such pieces must, of course, have plinths; they must be made so that they could be set down anywhere. Since then there has been great progress in France in this respect. Our modern school of statuary has found a new artistic vein in decoration, and it showed itself peerless almost from the very first. The works of Mercié, Falguières, Aubé, Croisy, Dalou and so many others indicate what can be expected from our artists. These works would never have been produced, if their authors had not abandoned in commemorative monuments the type of statues bearing their plinths.

L. C. BOILEAU FILS.

OFFICE-HELP FOR ARCHITECTS.[1]—XIV.

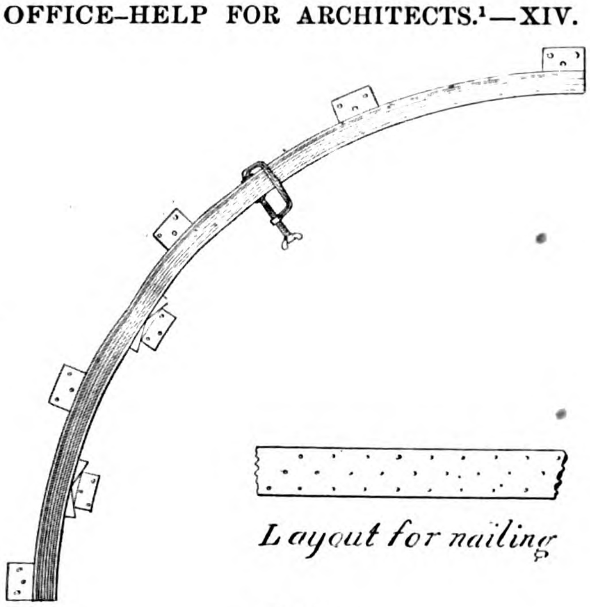


Fig. 55.

CHAPTER V. — ARCHES.

SECTION I. — WOOD.

§ 220. General: *Wooden Arches:* — Are usually made as solid ribs, built up of relatively thin pieces of wood sawed out of straight-grained plank, bent to a curved form and well spiked together. They should be built up by nailing blocks to the framing floor at about 3′ 0″, *c* to *c*, with their inner edges on the exterior line of the rib; then a second series should be placed about 1″ inside of the inner line of the rib, and blocks across at the ends of the ribs. The outer piece is first sprung in place and blocked up from the inner blocks; the second piece is then sprung in, blocked in place and nailed to the first. The third piece follows the second, nailing through all three; the succeeding pieces then follow, each being nailed through at least three layers (Fig. 55). If desired, ordinary clamps may be used instead of the inner blocks, or, the blocks may be nailed to the inner line of the rib and the pieces sprung on the outside. When the rib has attained the desired thickness, spruce laths are nailed to the sides to prevent any tendency to spring until the rib is secured in place. The outer course should be continuous over the entire length of the rib, if it is made to stop at the centre or crown, and should be made continuous over the middle third of the length if the rib is made semicircular.

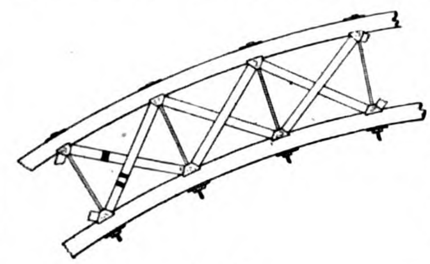


Fig. 56.

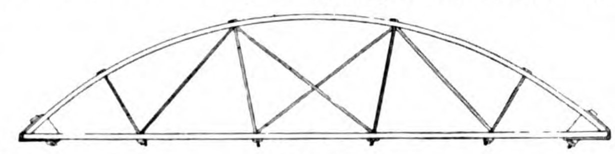


Fig. 57.

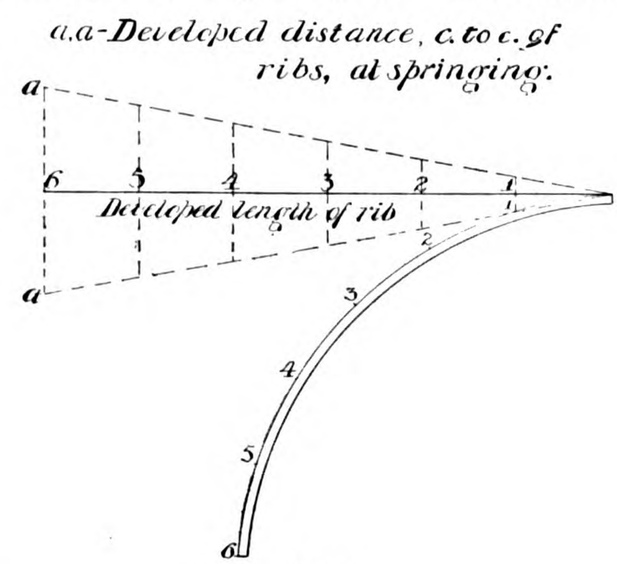


Fig. 58.

These ribs should be used in pairs one above the other, for barrel-vaults in ceilings, for roofs of moderate span, and for domes when the architecture requires a vault. For considerable spans, they may be used in pairs with web-bracing,

[1] By George Hill, Consulting Engineer. Continued from No. 912, page 180.

ABBREVIATIONS AND SYMBOLS.

= equal to.
|| parallel to.
÷ divided by.
× multiplied by.
+ added to.
a^2 a multiplied by itself.
$a > b$: — a greater than b.
$a < b$: — a less than b.
$\frac{a}{b}$: — a divided by b.
∴ therefore.
□′ square feet.
□″ square inches.
8* read 8 pounds per lineal foot.
[channel bar.
I I-beam.
T T-iron.
L angle iron.
⊥ deck beam.
● round section.

I ton = 2,000 pounds as this is the conventional ton, the legal ton is 2,240 pounds, but is rarely used.
l = the length between supports of any beam or girder or height of any column, always in feet.
b = breadth of any beam or girder, always in inches.
d = depth of any beam or girder, or the least transverse dimension of any column, always in inches.
L = total load uniformly distributed coming on any piece in pounds.
$L^{□′}$ = " " " " per square foot in pounds.
W = concentrated load on any piece in pounds.
S = span of any arch or truss between centres of end pins in feet.
A = area of any section in square inches.
M = maximum bending-moment in inch pounds.
n = distance of centre of gravity of section from either top or bottom edge in inches.
I = moment of inertia, neutral axis through centre of gravity.
R = moment of resistance of section.
r = radius of gyration, in inches.
Sc = safe compressive strain in pounds per square inch.
St = " tensile " " " " " "
Ss = " shearing " " " " " "
S = strain per square inch in extreme fibre.
P_e = upward reaction of support at left-hand end of beam.
P_f = " " " " " right " " " "
e = distance of centre of gravity of load from left hand of beam.
f = " " " " " " " " right " " "

the strains being analyzed as in § 195, tension-members being made iron rods, and compression-members in wood (Fig. 56). In connection with a bottom chord and diagonal bracing, they make very good light bridges and trusses (Fig. 57).

§ 221. Proportioning: *Arches:* — Lay off the static and vertical component of the wind-loads, adding the two together, analyzing as described in Chapter II, § 195, for arches. The strain-polygon will probably fall below the middle third of the rib, and the distance vertically from the strain-polygon to the centre of the rib at any point, multiplied by *H*, will give the bending-moment at the point considered, and this will determine the size of the section by solving for the moment-of-resistance of the section (see § 175, Table VI).

Sometimes an economy of material can be effected by making the ribs of I-section. Be careful to take the horizontal component of the wind-loads, and to take all moments in inch-pounds.

Domes: — For domes, the ribs should be spaced at the spring-line a distance apart on centres equal to about one-half radius, coming to a common centre at the top. The static load coming on the rib would be that due to a triangular piece of the roof starting at a point at the centre and widening out at the base to a distance equal to the distance on centres of the ribs. To obtain this properly, the rib should be developed (Fig. 58) and a line drawn across the foot of the rib to represent the base of the triangle, the length being equal to the distance

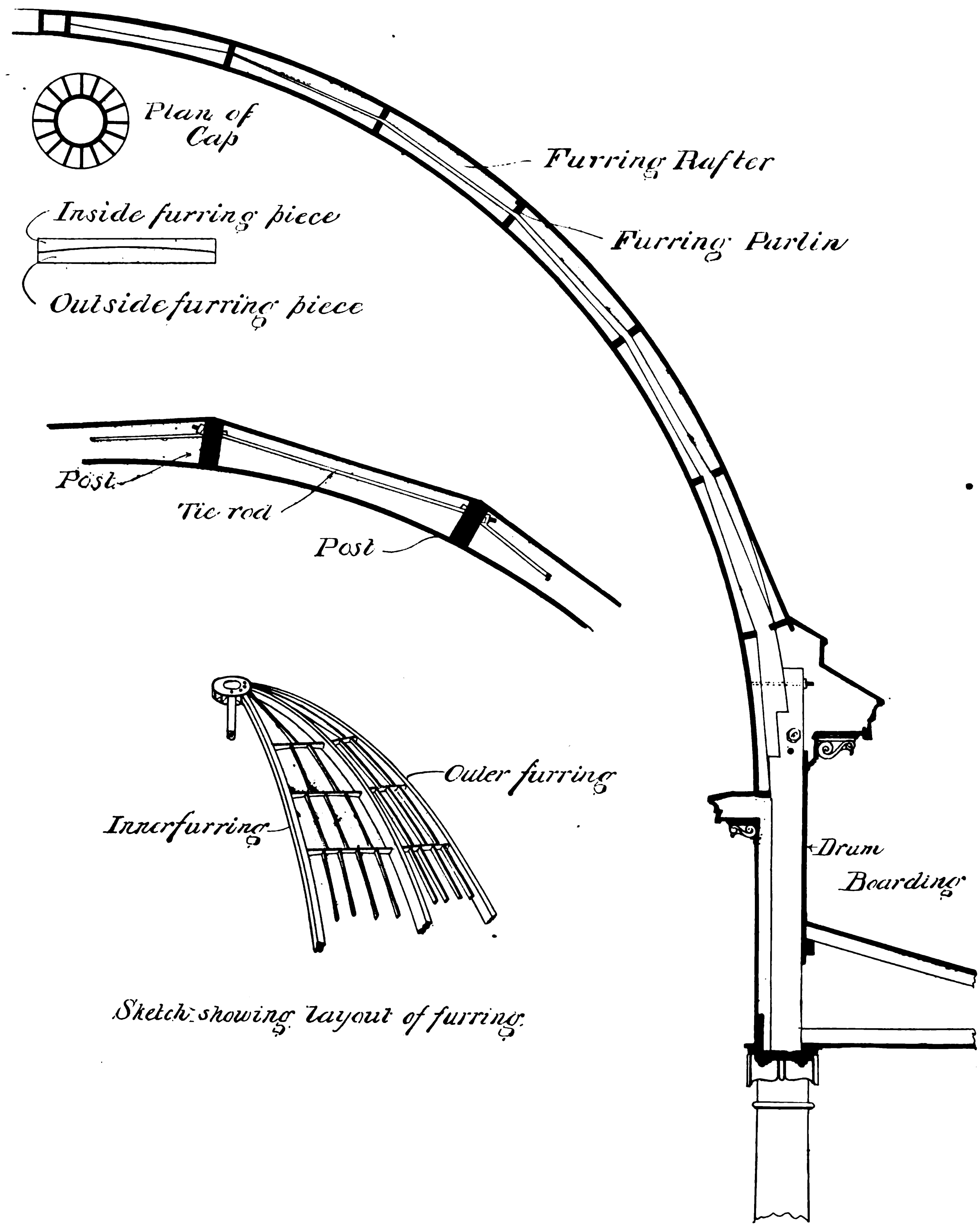


Fig. 5.

the ribs are apart. If the rib is divided into equal parts and lines drawn through these parts parallel to the base line, terminating in a line drawn from each extremity of the base to the end of the rib, these lines will represent the areas of the loads on the roof. The wind-pressures on these areas must also be determined normal to the roof, and then the strain-polygons drawn from both static and wind loads, and the two combined so as to get the maximum bending-moments. From this point on the treatment is the same as for arches. The curves of the ribs should be determined by the architectural requirements, and the section made strong enough to meet the requirements of strength.

Details: — The thrust of the dome should be taken up by means of the drum boarding or tension-rods connecting the posts carrying the ribs (Fig. 59*a*), and the covering of the dome, which should be made of ½″ x 4″ stuff, bent over the framing in any convenient direction, or nearly at right angles to the ribs. The top ends of the ribs should butt against a wooden or cast-iron block or cap, made so as to receive the ends of the ribs and keep them from springing out of place (Fig. 59). Where the ribs are used for a barrel-vault, and the walls are not sufficiently strong to resist the thrust from the rib, it may be taken up with horizontal girders as before spoken of. The space between the ribs in domes should be filled-in with furring, taking the place of rafters and purlins, as shown in Figure 59, the inner and outer parts being cut from one board, and all of the furring being cut from the one sweep or template. Large barrel-vaults should be framed with straight rafters furred down, as the strains are more easily found and provided for (see Fig. 47). For very large domes, the ribs might be framed in two parts with diagonal bracing, and tension-rods drawing the top and bottom chords together.

SECTION II. — BRICK AND FIRE-CLAY.

§ 222. Brick Flat Arches: — Should never be made less than 8″ deep, and generally the depth should be made equal to one-fourth span. They must be made with all joints radial, the radius being about three times the span. The radial joints may be made either by using common brick and filling the openings in the joints with slate chips, or by using moulded brick made especially for the purpose. When common brick are used, the arch should be limited to 4′ 0″ in length. Radial joints are a necessity, as otherwise the arch will fall eventually. In building, the centres should be so set as to give a crown of about $\frac{1}{16}$″ per foot, so as to keep the soffit level when the initial deflection takes place.

§ 223. Brick Segmental Arches: — May be used for any arch purpose, and always make a strong arch when properly built. They are usually laid with the long axis of the brick horizontal and the soffit of the brick showing 2¼″ x 8″, and then called a "rowlock" arch. When a rowlock is laid with common brick, the back joints must be filled with mortar with slate chips wedged in so as to give a firm bearing to the work. To lay the arch properly, the mason should begin at the skew-back and lay alternate bricks on each side until about one-third of the arch is laid on each side; then the second course should be started and carried-up about half-way up the first course. Then the first course should be finished out, the key-brick being the last to be put in place. For arches on the front walls of buildings, architectural requirements will usually fix the depth of the arch, but, where any weight other than a panel is to be carried, the arch must be at least as thick as is given in Table XIX.

TABLE XIX.

DATA *RE* COMMON BRICK SEGMENTAL ARCHES.

Span.	Rise.	Number of rowlocks.	Thickness.
2′ 0″	4″	1	4″
3′ 0″	5″	2	8½″
4′ 0″	7″	3	12½″
5′ 0″	9″	4	17″
6′ 0″	12″	4	17″
7′ 0″	14″	4	17″
8′ 0″	15″	5	21″
9′ 0″	16″	5	21″
10′ 0″	18″	5	21″

If r equals the rise of any segmental arch in inches then;

$$\text{Thrust per foot} = \frac{1.5\,L\,l}{r} \qquad (45)$$

Tie-rods should be placed about 4′ 0″, c to c and then

$$\text{Area} = \frac{\text{Thrust per foot}}{2{,}500} \qquad (46)$$

§ 224. Brick Domes: — To proportion brick domes, assume that two planes, one foot apart, are passed through the dome, equidistant from the centre of it and cutting from it the largest arch that can be cut, and assume that this arch and the load upon it represents the true arch and its load. While this does not agree with any theory that the writer knows of, it gives safe results. Where openings are necessary in the dome they may be made, provided there be a ring of carefully laid bricks around them to transmit the compressive strains. Domes in brickwork should never be less than two rowlocks thick, unless the dome is to be at once covered with earth, then one rowlock is sufficient for diameters up to 15′ 0″. The thrust from the dome will be given by Formula (45), L representing the total uniformly distributed load. If r be in feet then we have

$$\text{Thrust} = \frac{L\,l}{8\,r} \qquad (47)$$

In building, each horizontal ring should be laid complete before another is started, then as soon as six or eight rings are laid the following courses should be started building up about three courses and then alternate rings in the two courses should be carried up. Care should be used to see that the bricks of the first course are laid with full joints and that the bricks of the second course are laid in a full bed of mortar spread over the first course. After the dome is completed it should be rendered with a stiff paste of Portland cement. By building in this way the dome will act satisfactorily according to any of the theories of its stability and the cost of centering is reduced to a minimum.

§ 225. Fire-clay Segmental Arches: — Are made in two general styles: (*a*) with the voids in the blocks running parallel with the beams; and (*b*) with the voids running at right angles to the beam. Style (*b*), known as the Wight system from the inventor, Mr. P. B. Wight, is also called "end construction," and is fully 25% stronger than the other when the material is good, and for floors where the area unbroken by partitions is likely to exceed 2,500 square feet it should always be used. For office-buildings, dwellings and the like, the old style gives a large surplus of strength and as it requires less careful supervision may be used. In the use of the segmental arch of fire-clay there is, practically, but one size to use, 6″ deep, and that may be used for spans up to 18′ 0″ with a rise of 12%. The conditions as to thrust, etc., are the same as for brick. They should be used only when the ceiling under is the soffit of the arch, or, is to be left without a hanging ceiling or the conditions of the framing are such as to require the large span. For *domes* the treatment is the same as for tiles. See § 229.

§ 226. Fire-clay Flat Arches: — For data *re* the arch blocks, see Chapter IX. Thrust is given by Formula (45), taking the rise as equal to 0.8 thickness of the blocks. The strength of the flat arches is very great and therefore it need be but seldom considered. Considerations of the depth of the floor-beams required for sufficient stiffness will usually fix the depth of the block as it is both lighter and cheaper to make the block of the depth of the beam than to level up to the required point with cinder concrete. Warehouse floors and all floors of fireproof structures having an area of 2,500 square feet or more unbroken by partitions should use the Wight floor-arch block as it is very much safer in case of fire.

SECTION III. — TILE, OR GUSTAVINO, ARCHES:

§ 227. Materials: — These tiles are made of slabs of fire-clay 1″ x 6″ x 12″ burned to the verge of vitrification. The slabs used for the first course are sometimes moulded with a rebate on all edges but this is not necessary. The first course should be laid in plaster-of-Paris, the second course lays breaking joint with the first in two directions and is laid in Portland cement. The third course breaks joint with the first and second (Fig. 60). In the laying a swinging scaffold is made for the mason, consisting of a few plank, the centre is a single 1″ board cut on the edge to the proper curve and the tiles are laid on it so as to balance until the second course is laid, when the arch becomes self-sustaining. Workmen should be kept off of it for 24 hours, however, as the arch will collapse if loaded

while still green. Should be laid segmental either as plain arch, domed arch or groined arch. In exposed work it has been found best to lay all of the joints diagonally. Where the interior is to be finished in masonry the tile makes a beautiful finish.

§ 228. Proportions: — Thrust found from Formula (45), for thickness t in inches we have

$$t = \frac{L\,l}{200\,r} \qquad (48)$$

Rise should be always at least 10% of the span. Where the span exceeds 12′ 0″ the haunches should be thickened up

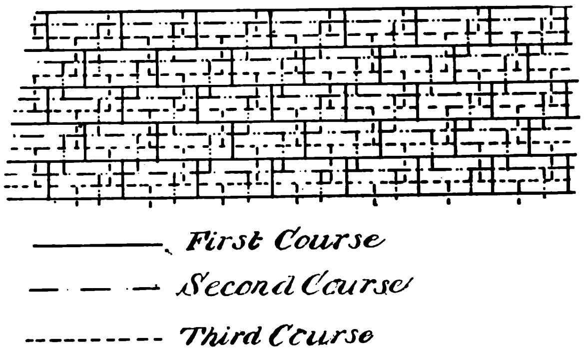


Fig. 60.

one course for one-third of the span on each side for each excess of 2′ 0″. If the arches are intended for use in a place where there is any possibility of there being vibration their thickness must be made 10% greater and the haunches of the arches levelled with good concrete up to a point at least 5″ above the crown of the arch. Use for segmental arch should be restricted as noted in § 225.

§ 229. Domes: — Proportions determined the same as for brick domes, § 224. In this case the skew-back should be made of Ls, as they work excellently. Large masonry domes over chapels and the like should be made with two separate domes one about 1′ 6″ inside of the other and connected together by means of ribs spaced about 4′ 0″, *c* to *c*. If the dome is of 30′ 0″ diameter or over, iron tie-rods should be put between the two layers for each 10′ 0″ of the length of the dome measured along a great circle, the ties going in horizontally.

SECTION IV.—STONE:

§ 230. Proportions: — Stone arches may be either flat or segmental. Usually determined by architectural considerations. Where they do not show, make the rise and thickness the same for a given span as for brick. In stonework considerable care must be exercised to see that no gravel gets into the mortar of the joint as it would probably crack the stone badly. For arches carrying great weight, careful computations should be made, the form of the arch so determined that the equilibrium-polygon will fall within the middle third of the stones, and the pressures on the stone such that there is a wide margin of safety or limited to those given in Table IV. In very large arches where any cracks would cast suspicion on the work, the first three joints from each skew-back and the two joints on each side of the key-stone should be made in asphaltic felt ¼″ thick, the felt being kept 1″ away from the face of the joint and the joint pointed-up just before the final acceptance of the work. The horizontal component of the thrust should be carefully provided for as it will often be considerable.

§ 231. Domes: — Domes are proportioned the same as for brick or tile. They are very expensive, very difficult to build so as to be lasting as they require that every stone shall be cut exactly right, evenly bedded and perfect. Domes should not be attempted in stone unless the foundation is rock or a bed of gravel or sand at least 40′ 0″ deep, as the slightest settlement of the piers will probably cause a redistribution of the loads and the cracking of many of the voussoirs. Should a dome be inevitable the drawings should be all examined by an engineer of proved ability, and if the substrata are of a compressible nature the dome should be tied as described for the tile dome by means of metal rods, with provision made to take up the expansion and contraction of the metal, either by springs or by weights hanging on an arm which is raised or lowered by changes of temperature.

SECTION V.—METAL:

§ 232. General: — Where small ribs only are intended it is best to use bent angles riveted together back to back. For larger ribs two pairs of angles with a lacing should be used and the size made sufficient for any span by adding plates to the sections used. Where the two parts of the ribs are not more than 2′ 0″ apart, the equilibrium-polygon should be determined and from that the maximum bending-moment, thus finding the value that R must have. Very large ribs should have the sizes determined as in Chapter VI. For domes, proceed as described in § 221 for wood domes.

[To be continued.]

ANOTHER ARCHITECTURAL KNOCKABOUT.[1]—VI.

ON the train between these two cities, we were treated to a very disagreeable, and not less characteristic sight. Packed like sardines in a third-class compartment, without divisions, we found with us gendarmes with loaded guns, women, laborers, herdsmen and travellers. About midday, the train creeping through a wild, uncultivated section of the country, stopping now and then at little adobe stations, we noticed that two herdsmen or laborers were opening their basket of lunch, sharing it between them. The man who was opening it, took out a long piece of bread, breaking it into two equal pieces and handing one to his companion. The bottle of wine was to be drunk "on the square" by both, but when it came to the division of the great red Spanish sausage, the first man, evidently believing in the maxim that possession was nine points, etc., made a palpably unequal division of the luscious article, keeping the larger part for himself. With a torrent of imprecations the other objected and refused the smaller piece offered him. This amounted to nearly a row, but no one interfered. It was a sickening sight to me. The gendarmes paid no attention to them whatever, and on looking at them in remonstrance I only received a stony stare in return. Finally the turmoil subsided, the injured one said the difference would be settled at the next station. So moving away from the contaminating proximity of each other's presence, they ate their unequally divided food, with looks of terrible hatred, both refusing to touch the bottle of wine as neither would take from the other, and I noticed that a woman, watching the row, leaned over the back of their seat, and quietly taking up the bottle, commenced to satisfy her own thirst and that of her neighbors. As the train slowed up at the next station, both men jumped out before it had come to a stand-still, followed by all the passengers, we among them. The duelists, without a word spoken, with no interference from gendarmes or passengers, tore off their coats and, drawing their stilettoes, rushed at each other stabbing and cutting most frightfully. Horrified by the spectacle, I again tried to get it stopped, but was thrust rudely back, and it was only when one lay dead and the other dying, that the two gendarmes pompously arrested them, with all the importance of a Napoleon Bonaparte. The rest of the journey, to a larger station, was made, with these now very silent antagonists, lying on the floor of the same carriage with us. Averting our eyes from the horrible sight, we felt that our own lives were not worth much should we do anything to attract the attention of the excited Spaniards, aroused as they were, by the sight of so much blood. This was our only experience of real Spanish brutality with the knife. There were other sights I will not narrate and once in my own case it was only the expeditious display of an American revolver and a shot in the ceiling that saved my life.

Arriving at beautiful Seville, we found that owing to its being nearly Easter, it was very difficult to get cheap rooms. Such proved the case. In spite of hours of search, and our most beguiling smiles, we failed to find lodging suitable for our purses, so we decided to go to the best hotel the city afforded and get all its luxuries, paying no more than we should have done for a room. We secured a splendid room in the "Hôtel Madrid." This hostelry is one of the best and most comfortable in Europe, even if it is in Spain, the meals being irreproachable, and no expense being spared to place before its guests every known luxury of modern times. Entering, you come

[1] Continued from No. 913, page 196.

suddenly into, apparently, a beautiful garden, for the large square court, surrounded by an arched portico, presents a most beautiful sight, the whole open to the sky, and in the centre a large marble basin, a minature lake filled with all sorts and conditions of the finny tribe, while around and through the park, wander and twist eccentric paths, overhung thickly by shrubbery of every description, palms, palmettoes and tropical plants growing and flourishing with the utmost profusion. Some as tall as the trees, reaching far above the tympanums of the arches. We did Seville thoroughly: architecturally its beauties are legion. Revelling in the cathedral I made sketch after sketch of the Giralda tower, with its great revolving figure from which it derives its name. One day, tired of the arts, we went to the "Fabrica des Tobaccos," and were led through room after room of this enormous factory, filled with women and girls, three thousand in all, I believe, all working with marvellous celerity, each turning out fifteen cigarettes a minute: sitting in rows, at long tables, with heaps of the granulated tobacco in its centre, they would seize a cigarette paper, and by a mere dash with their fingers into the mass, take from it the exact quantity required for the cigarette, transfer it into the paper, and by one quick roll of the mass, the cigarette was completed. We saw them make cigarettes with each hand simultaneously. These women were for the most part good looking, but it was a pitiful sight to see the squalor and untidiness they presented. Often they appeared half-clothed — as the atmosphere in which they worked was hot and close — and made no pretence (nor was it enforced before visitors) to cover their persons more completely. At their sides were also great baskets filled with more tobacco, and invariably, lying half buried in the redolent weed, a tiny babe; nearly every soul there seemed to own or be taking care of an infant. Think of a child sleeping daily in a bed of strong tobacco! These young matrons, also usually kept their food buried with their infants in the same basket. The whole sight was most unpleasant, and refusing the constant invitations to indulge in conversation and newly-made cigarettes, we left the poor spectacle with a feeling that something was radically wrong somewhere.

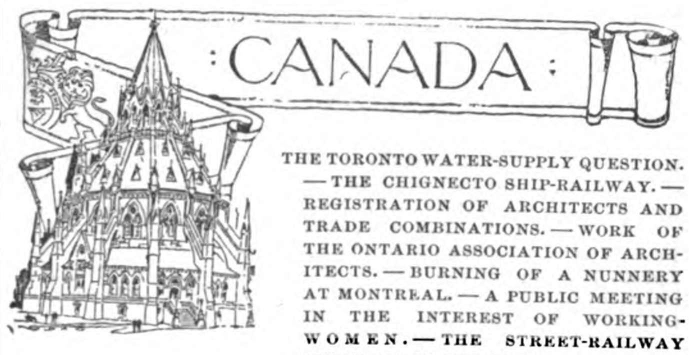
Seville is, as I mentioned before, a very expensive luxury, especially in Easter week, and staggering as we were under our hotel rates we felt we could hardly stand them doubled, so resolved to take up our traps and move to other parts. After taking a long walk over the splendid city, and indelibly impressing its beauties of architecture and color on our memories, with a farewell "*café nero*" in the portico of the Hôtel Madrid, we left this Spanish Paris with many regrets and set out for Cordova, where we arrived after a fatiguing journey of a whole day.

Here at Cordova, I made a complete study of the mosque, the court-yard and tower of its beautiful cathedral, so similar, in general outline, to that of Seville. The interior of the mosque has been likened by a French author to a "roofed-in forest," for the thousand columns and entwining arches overhead, make indeed a stone grove, with polished shafts of stone brought from many a mosque and palace of the Moors for the trunks of the trees, and the arches growing larger and more spreading as they rise higher, presenting in very truth a forest. I am not discussing architecture nor will I attempt to describe its beauties, which my superiors and betters have done before me, and I would only show but poor taste in attempting to criticise and describe these great monuments, which kind fate allowed me the great privilege of gazing upon. Our Bohemian life ceased after this, for we did not remain long enough at any place to be really imbued with its life, finding that as we went farther north the atmosphere of art was lost in that all-absorbing spirit of trade. At Madrid, where we found ourselves after journeying from Cordova and Alcazar, we lived in a little hotel, off the Puerta del Sol, called the "Peninsalar": originally a monastry, its queer staircase and rooms were most interesting. Here we put up cheaply, though the oily cuisine of Spain made itself prominent as usual. Madrid is a great French town, nothing more; its gallery of pictures is magnificent, but far more appreciated by the foreigner than the native, for, as a rule, the latter are indifferent to their treasures of art, and with the exception of the Alhambra, the only monument they make any pretences to keep in a state of preservation, only value them as a source of income to the State, in attracting foreign money into the country. The Spaniards love beauty, however, in their impulsive way, and will always give voice loudly to their admiration; for instance, I have often observed when a pretty American or English girl was walking on the streets with her parents, or even a handsome Spanish woman, a Spaniard, or sometimes two or three, would stop short, or walk along with the girl and her mother, and in very flowery language, tell her that she is beautiful and that the country and community at large thanks her and is benefited by her presence. More often do they stop short, remove their round Spanish hats, and hurl them to the ground, at her feet, crying out, as she steps gingerly and daintily around or over them, "*Hole!* for you beautiful one." *Hole!* for your father and your mother. I admire you." This is done repeatedly and as she passes on without a word, they pick up their hats and look admiringly after, but rarely follow. This act is done with the utmost sincerity, no rudeness whatever is implied, and it is a most characteristic sight, though this admiration for beauty be displayed in so flowery and bombastic a way. The Spanish dress, the day of the mantilla is over, and is hardly to be seen except on Easter day and Sunday, and then not always; bad Parisian fashions, with the individual Spanish ladies own idea of color, have taken its place. One sees frequently most beautiful faces, yet when a Spanish woman is ugly, she is without exception the most unfortunate spectacle possible to gaze upon.

We went one day to see the "lavendéras," or washerwomen, of Madrid, who sit in or kneel in little wooden boxes on the muddy edge of the Manzanares river, thousands of them, scrubbing and rubbing and pounding the city linen between flat stones. Now and then there is a shriek, when a piece is carried off by the current, and is fished back to duty by the overseer with a long hooked pole.

When leaving Madrid *en route* for Toledo, hurrying to the station our closed carriage was brought to a sudden halt by armed gendarmes who ordered our instant exit from the vehicle. On our refusing to do as they commanded, we were literally dragged out and ordered again to doff our hats. On stoutly refusing to do this, a general scrimmage ensued, and while it was taking place, I noticed a very gallant equipage passed by escorted by a cordon of the military. In the open barouche sat a nurse, gotten up in very gorgeous style, and holding in her lap, fast asleep, adorned with much gold lace, a sleeping infant with its thumb in its mouth, totally unconscious of the affairs around him, and of the sight of the gendarmes holding us tightly by each arm, as they bowed to the ground and tried to compel us to do likewise in reverence to the very young King of Spain! F. L. V. HOPPIN.

[To be continued.]



THE TORONTO WATER-SUPPLY QUESTION. — THE CHIGNECTO SHIP-RAILWAY. — REGISTRATION OF ARCHITECTS AND TRADE COMBINATIONS. — WORK OF THE ONTARIO ASSOCIATION OF ARCHITECTS. — BURNING OF A NUNNERY AT MONTREAL. — A PUBLIC MEETING IN THE INTEREST OF WORKING-WOMEN. — THE STREET-RAILWAY QUESTION IN TORONTO.

SCHEMES for the supply of pure water to the City of Toronto darken the air; almost every day some new one is projected, but two recently presented to the public on the same day are worthy of particular notice. It is no secret now that the present system is doomed — that the thousands spent already have been literally thrown away and that the costly steel conduit laid only a year ago was hopelessly ruined by the accident of the winter, which a little foresight would have prevented. The first of these schemes seems very simple and feasible: it is to tunnel the rock which underlies the harbor, extending the tunnel into the Lake to a point where the water is seventy feet deep, thus forming a conduit which would be as solid as the present one is weak. It is estimated that the cost would be $800,000, but the simplicity of the idea recommends itself to the citizens and even to the aldermen, so that tests are to be conducted without delay to ascertain the exact nature of the rock along the course of the proposed tunnel. It is a very unusual thing to find the public jumping at the outlay of so large a sum, but at last it is awakened to the knowledge that there has been too much fooling over the water-supply and it comes as a relief to the anxious mind of the rate-payers, who in the event of the failure of this scheme are asked to consider another, the cost of which would not be less than $65,000,000! The public meeting called to discuss this large outlay began by formally passing a resolution of a somewhat unusual character, viz.: "That this meeting desires to express its regret that for the last decade there has been a lack of the old-time enterprise that once characterized so many of the citizens of Toronto, and it is high time that something should be done to place this city in the position which the natural advantages she possesses entitle her to." Having thus stigmatized themselves and their fellow-citizens, the leaders proceeded to unravel their plan which would convince the public that they at least should be excepted from the sweeping condemnation, although with a proper sense of humility they had included themselves therein. They would now give an exhibition of the aforesaid "old-time enterprise" and by way of commencement, would advocate the immediate expenditure of sixty-five millions! This amount they considered would enable the city to make an attempt to reach the position she is entitled to. Some sixty-five miles north-northeast of Toronto (as the crow flies) there is an arm of the Huron Lake known as the Georgian Bay. It is proposed to construct an aqueduct for the purpose of supplying the city with water from this bay — the aqueduct to be tapped at intervals to aid in the excavating of a great canal which shall run parallel with the aqueduct and make a water highway from Georgian Bay to Lake Ontario. This canal it is stated would shorten the Lake route to the city by four hundred miles while the flow of water through it would provide motive-power for "driving machinery — lighting, heating and smelting works and for fire-protection as well as for other works not enumerated." "An incalculable amount of tonnage would be brought past our doors," and finally it would be seen that there were some living who still had the spirit of old-time enterprise in their breasts

and skulls. The canal scheme is no doubt a good one despite the ridiculous method of proposing it, but unless it is proved that we can bring water to the city from a distance of over sixty miles cheaper than we can from our own lake at a point some five miles out from shore, it would be out of the question to attempt it. The canal is not to be the means of supply; that is to be furnished by the aqueduct. The Toronto Bay having an area of about four miles by two, enclosed by sand-banks, is fouled horribly by sewage, but beyond this is the magnificent sheet of water forty miles wide opposite Toronto and surely some efficient way can be found of using it. Had we not already spent hundreds of thousands of dollars in impracticable schemes, there would be no thought of going sixty miles for water, but as of late every drop of water for drinking has had to be boiled and this kind of thing has been going on so long, while there are continual breakdowns in the pumping-machinery and threats of water famine every few months, it is thought by some that an entirely new plan should be adopted. Canal projectors are not particularly well received in any part of the globe at present. Investors fight shy of them as they do of mines, so that it is hardly likely the required sixty-five millions will be raised at present. A small committee was formed to take such action as may be deemed necessary and expedient to further the objects of the aqueduct and canal scheme.

At the present moment the Dominion Government is considering the question of taking-over the works of the Chignecto ship-railway and completing them to save the credit of the country in that particular, as the investors in the undertaking are principally in England, but ship-railways or canals are such uncertain things that their projectors had better lie quiet for a while.

The Ontario Association of Architects' Bill for the amendment of their original act came before the Provincial Legislature shortly before the close of the session, but on the advice of the Committee in charge of it, it was withdrawn and the objectionable word "registered" remains. It appears that the members of the House are not sufficiently clear-sighted to distinguish between the protection of the public against imposters and the formation of "combines" for self-aggrandisement, or trade monopolies. It was a noticeable feature of the session that many dealers sought legislation with a view to keeping trade to themselves. The druggists sought to prohibit every one but themselves from selling patent medicines; but as these commodities are so sealed up that there is no risk to the buyer and no possibility of their being tampered with or adulterated by the sellers, their contentions were over-ruled. Then came the milk-dealers, arguing that only a few of them were capable of selling pure milk, and they, too, were requested to step down. After them rose up the undertakers who declared that there was imminent danger to the public in permitting any one to ply the trade and that no one should bury or embalm without he associated himself with them. After this, the members naturally looked round and asked "What next?" fully expecting to see "the butcher, the baker, the candlestick-maker" march in with a rub-a-dub-dub. This being the state of the atmosphere it was thought useless to push the Architects' Bill, for the House was not in a mood to contemplate seriously what would be the effect to themselves if their seats suddenly gave way or the roof fell in upon them or if on their return to their homes they found them collapsed, or their families poisoned by sewer-gas or otherwise killed through the inefficiency of the so-called architects who had been employed by them. Finally, the government vetoed a proposal to prescribe professional examinations for railway engineers, conductors and brakemen. Thus, the Association is no better off or farther advanced in its objects than before, except that the good work it has already accomplished in the examination of students and would-be members has opened the eyes of many who at first could see no good of such a society. So many students have successfully passed the examinations, that the public involuntarily notices the fact, and where two or three young architects are together, one of them having passed examinations and the others not, the one naturally is preferred over his fellows. The work the Association has begun cannot now be stopped, it has, in spite of considerable opposition, inaugurated a new era, and become itself a necessity of the time, though there still are some who deny this. The opposition grows weaker every year, not because it is weary of its useless fuss but because the minds of the opposers are awakening to the need of such an organization. The Ontario Association can contemplate with pride the work already done and look forward more hopefully than ever, even in the face of the present hindrance, to the ultimate general recognition which in a few years will be extended towards it.

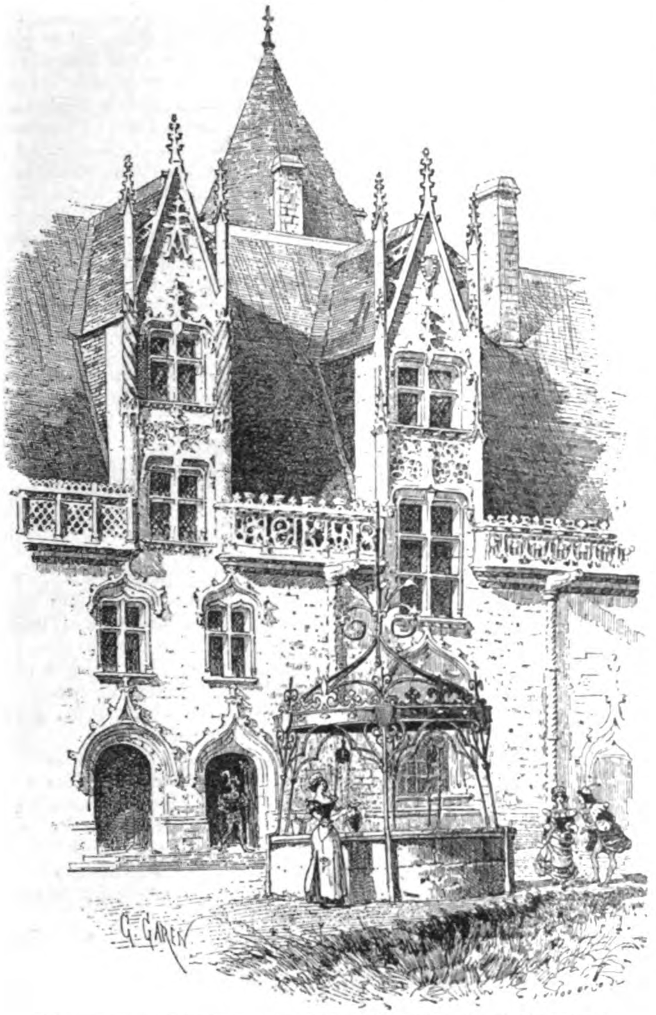
Every one who has visited Montreal will remember the great nunnery so conspicuously situated on the western spur of the "Mountain," the first object that meets the eye as the city is approached either by rail or boat from the west. The property is known as Monklands, belonging to the great religious order of the Ladies of the Congregation, or the Congregation Nuns as they are more generally known. A fine church and school building were recently erected and the whole group was probably worth $100,000,000. A fire broke out in the institution on June 7th and despite the efforts of the fire-brigade, which had some distance to come from the city, damage was done to the extent of at least half a million dollars, the nunnery, church and schools all being destroyed. The nuns to the number of three hundred lost their home, but an adjacent convent known as Ville Marie was happily saved. This was used chiefly as a ladies' school and great alarm was at one time felt on its account. The nuns, who own an immense amount of property in Montreal, do not appear to have been sufficiently careful about their insurances, for it seems that on the buildings destroyed there is only $102,000 insurance, divided among four companies. The building burned very rapidly, its exposed situation, probably, having a good deal to do with that, and the fifty inmates of the infirmary were only saved by the hearty exertions of the nuns and their neighbors. The Reverend Mother St. Ursule, who has been paralyzed for the past two weeks, became unconscious when the fire broke out. She is between eighty and ninety years of age, but it is thought she will recover.

Under the auspices of the Working-women's Protective Association of Toronto, a mass-meeting in the interest of labor was held in the Pavillion early in June. The meeting had been largely advertised and it was understood that a great "kick" would be made on behalf of the many poor women, who are said to be working for a dollar-and-a-half a week, but beyond an allusion to the subject nothing particular seems to have been done. A few well-known ministers, Protestant and Roman Catholic, and public men made speeches, but no resolutions were passed, and apparently the Working-women's Protective Association was not materially aided by the affair. The meetings of the various labor organizations have for some time been very tame, there seems to be very little to meet about and but few matters upon which they can agitate; the wages questions have been settled by agreements which are to remain in force for three years, so that beyond the purpose of maintaining their organizations they might almost as well not meet.

There is a somewhat curious complication of affairs at present between the City of Toronto and the Street Railway Company which is necessarily occupying a great deal of attention. The Electric Railway Company has by its agreement to extend its line along certain thoroughfares within a given time and having agreed to do this and prepared for it, expects to reap an enlarged revenue when the time elapses. The Company is to put down its own rails paying the city $800 a mile for road-rent and so on, the city doing the necessary paving works. But as the city has not done the paving and is not prepared to do it, the Company threatens in consequence "to have the law at them." To avoid litigation, however, the Railway Company suggests that it should be allowed to do the paving as well as laying its own rails and forego the payment of the annual mileage. This it is pointed out would give the Company a vested interest in the portion of the streets paved by them and endless difficulties and disputes would probably be the result. The city is considering an agreement drawn up by its solicitor and engineer, which allows the Company to do the paving but only under the supervision of, and to the satisfaction of the City Engineer. The spirit with which the engineer has always met the Company, obstructing it wherever possible, cutting down its poles (which though not according to the agreement were declared to be only temporary and put up for the obvious convenience of the public until the specified ones could be procured) and issuing almost bi-weekly injunctions against it, if it did anything he thought was contrary to the letter of the agreement, — is hardly likely to make the Company willing to work under him; but as it is apparently beyond the power of the city to keep to its part of the agreement and do the paving owing to the atrocious mismanagement of everything by the miserable Council and its figure-head mayor who rules the roast, lively times and frightful cost to the rate-payers are likely to ensue.

LIQUID OXYGEN. — The most popular scientific lectures of the day in London are those which Professor Dewar is delivering upon "Atmosphere" in the theatre of the Royal Institution. His experiments with liquid oxygen, to which reference has been made in the *Evening Post* more than once, are peculiarly interesting. On a recent occasion he explained the construction of the glass flasks containing the liquid oxygen. He showed that they were simply glass bottles provided with double walls and bottoms, the outer one being distant from half to one inch from the inner one. The interior bottle was open at its neck to the atmosphere in the usual way, but the outer bottle was fused securely to the inner one at the neck, leaving an empty space all around the inner bottle. From this space the air was exhausted by powerful air-pumps, and the result was that anything placed in the interior bottle could not absorb heat from the atmosphere or other surrounding objects. Sometimes two vacuum jackets are used to secure complete isolation, and, in addition, the outer surface of the inner bottle was coated with a deposit of mercury. Professor Dewar then proceeded to demonstrate the various qualities and properties of the liquid oxygen. He poured the fluid about from vessel to vessel like so much water, noting the fact that it was nearly always boiling and rapidly passing back into its gaseous state. He inserted a thermometer into it and showed that the fluid was boiling at a temperature equivalent to several hundred degrees below the freezing point of water. Absolute alcohol thrown on the surface promptly gave up all its heat to the oxygen, and turned to a mass of ice, which was shown to be quite incombustible until remelted. Drops of the liquid thrown on a piece of rock salt behaved exactly as spots of water on a red-hot plate, assuming the spheroidal shape and spinning about. The electric light passed through a globe of liquid oxygen and then, broken up by a prism, showed the same dark lines of absorption on the spectrum as in the case of gaseous oxygen. The magnetic properties of the fluid were strikingly displayed by placing a dish of it between the poles of a strong electro-magnet. As soon as the current was turned on the oxygen dashed up out of the dish, and clung around the ends of the poles, rapidly dissipating into smoke, which exhibited in its turn a similar tendency. — *New York Evening Post.*

RUSSIAN INDUSTRIAL ART.[1]



Well in the Chateau de Josselin. From *La Semaine des Constructeurs.*

MY first experiences of Russia were at St. Petersburg, that capital which owes its existence to Peter the Great — a city of stately palaces, of immense squares, of handsome monuments, but with little distinctively Russian about it. St. Petersburg was the window from which Peter looked into Europe. When he came to the throne, Russia was in a non-progressive state, clinging to the past with its superstitions and traditions, and bearing the impress of the Tartar yoke. He determined to cut asunder the bonds which tied her to the East, and create a new Russia by opening the door to Western civilization.

It has been said that Peter's reforms did more harm than good to his country, by interfering with her gradual development, that Russia, left to herself, contained all the elements of national greatness, and that it was too soon to polish her in accordance with Western ideas. However this may be, there can be no doubt that the genius of Peter raised Russia to the rank of a first-rate power, and that, had it not been for his reforms, she would have remained in a semi-barbarous state, a stranger to the arts, the industries, and the sciences of Europe.

St. Petersburg is a medley of Italian, French, German, and Dutch styles, or rather it has no architectural style about it. In its chief street — Nefsky Prospect — you might imagine yourself in Turin, or Paris, or Munich, were it not that the painted sign-boards over the shop fronts, the dress and appearance of the people, and the mode of harnessing the horses, remind you that you are in Russia. St. Petersburg, however, contains magnificent public buildings, and many priceless treasures of art, stored away in palaces, museums, and private collections.

St. Isaac's Cathedral, designed and built by the French architect, Montferrand, with its five gilt domes, its monolith columns of polished granite, and its gorgeous interior, is a grand conception, carried out in spite of every difficulty. The design is foreign, the malachite and lapis-lazuli columns before the altar-screen are hollow, the splendid mosaics are of foreign workmanship; yet the whole edifice is impressive, and has something distinctly national, if only in its vast proportions, and in the costly materials used in its construction. None but a Russian Tsar, the head of Church and State, could have, at so lavish a cost, erected so noble an edifice designed solely for the worship of God. Mr. Beavington Atkinson, in his work, "*An Art Tour to Northern Capitals of Europe*," says: "The world owes its great cathedrals to the combined religious and temporal power." St. Petersburg — this northern Venice, as it is called — is in startling contrast with the squalor and poverty surrounding it. When once you are beyond the twenty-mile radius, and have left behind the capital and its elegant suburban retreats, you are in a wilderness of marsh and scrub-wood, with here and there a village of dilapidated log-huts and a poverty-stricken agricultural population barely furnished with the necessaries of life.

The Hermitage, so called by its Imperial foundress, the Empress Catherine, is a palace of art, in its way as splendid as St. Isaac's. Its collections, comprising the famous treasures found at Kertch, are unsurpassed. Here are specimens of Greco-Scythian and other early arts, which have helped to build up the Russian art of to-day. What this Russian art is, and of how many elements composed, are questions upon which authorities differ. Besides Greco-Scythian, Scandinavian, Greco-Byzantine, Mongol, Indian, Persian, Central Asian and Finnish have been mentioned. To these have to be added the later influences of Western Europe: Italian, German, French and English. With regard to Scythian, M. Vladimir Stassoff has pointed out, in the *Magazine of Art*, that Mr. Alfred Maskell (who follows M. Viollet-le-Duc) in his South Kensington "*Handbook of Russian Art*," is wrong in identifying the nomadic Scythians depicted on this celebrated Nikopol vase with the ancestors of the Russians, for the Poliani-Kiani, whom Nester mentions as the ancestors of the Russians, were a peaceful, agricultural people, altogether distinct from the warlike Scythians of Southern Russia, and Father Martinoff takes the same view.

Composed of so many and such heterogenous elements, one might have supposed that the native art would have altogether disappeared; yet, in spite of these adverse circumstances, there remains a substratum peculiarly Russian underlying the foreign superstructure. This native art may probably be seen at its best in the works of the young Russian school of painters, sculptors and authors, in their efforts to attain realism, to make the canvas, the stone, the bronze and the writing speak for them, and tell of the realities of Russian life. This realistic side of Russian art is exceedingly interesting, for studies of real life are often true to nature, while attempts at an ideal in religious art, for want of inspiration, fall short of the sublime.

There is hardly a cathedral, church, or monastery throughout the Empire that has not some traces of Greco-Byzantine influence. St. Sophia at Kief, with its mosaics of the eleventh century, and the Cathedral of the Assumption in the Kremlin, at Moscow, are examples of the earlier style. The plan of all these buildings is the Greek cross: a dimly-lighted, almost dark interior, walls painted with frescoes, a gorgously decorated ikonostas, or altar-screen, and a great central dome, or cupola. The general effect, during a religious ceremony, heightened by lighted tapers, burning incense, the chanting of the choir and the rich vestments of the priests, is very impressive.

While following Byzantine models in the general design, Russian architecture adopted a peculiar form of cupola, resembling an onion, altogether distinct from the domes of St. Sophia at Constantinople, St. Peter's at Rome, St. Paul's in London, and St. Isaac's in St. Petersburg. This bulbous cupola, said to be of Central Asian origin, and surmounted by a cross rising from a crescent, is characteristic of ecclesiastical architecture in Russia.

In decorative art, these same Byzantine influences, due to the close intercourse between Russia and the Eastern Empire before and after the introduction of Christianity, are equally conspicuous. They may be noticed in the silver pectoral crosses and other metal-work, the wood-carving, the embroidery on leather, and even in the textile fabrics. The English and foreign embassies which visited Moscow in the sixteenth century were much impressed with the gold and silver plate in the Tsar's palace. Some of this was doubtless brought as presents from foreign countries, some was the spoil of war, but the greater part was manufactured in Russian workshops. In 1880, our Government applied to that of Russia for permission to reproduce some of the numerous examples of English plate and other works of art in the imperial collections. The Emperor having graciously consented, a number of electrotype fac-similes were made and brought to England. These are exhibited in the galleries at South Kensington. They include vases, cups, flagons, salts, tankards, and jugs, besides a number of other pieces used at State banquets. Russian silversmiths' work has obtained a world-wide reputation both for elegance of design as well as for the purity of the metal used.

Enamelling on gold and silver is another art peculiarly Russian, derived also from Byzantine and Eastern sources. When Russian art ceases to be Eastern in character, it will have lost its claim to be regarded as a national art. Imitations of English, French and German designs, however skilfully made, for the Russian artificer is a good copyist, are, after all, only imitations. To form a true idea of Russian art, it is necessary to visit Moscow, Novgorod, Kief, and some of the monasteries and churches. But I must now say something of the manufacturing industries centered around Moscow.

Before the reign of Peter the Great, the industry of Russia was of a domestic, local character, and confined to villages. The chief articles of manufactures were woollen goods, cordage made of hemp, a coarse kind of linen, leather, metal-work, and articles made of wood. These were for home consumption as well as for export abroad. After the famous act of Boris Godounoff, obliging the

[1] Extracts from a paper read by E. Delmar Morgan, before the Society of Arts and published in the *Journal* of the Society.

peasants to give up their roving propensities and become fixed to the soil, the native industries greatly increased, that of leather especially benefiting. The leather industry was then centered in the governments of Kazan, Nijni-Novgorod, Moscow, Yarozlaf, and Kostroma; tallow-melting works were also numerous; soap was manufactured at Kostroma; tar came from the district of Kargopol and the Vaga, where potash was also produced for export; Moscow wove cloth and silk stuffs, deriving the raw material from Persia; Kholmogory produced iron-bound trunks and cases; Yarozlaf, small ironware; Tula was the small-arms factory, a position it has retained to this day; from Vladimir came the ikons, or religious paintings on wood. As the demand sprang up for some new article, whole villages devoted themselves to its production, and these industries became hereditary, descending from father to son for generations. The next step was their organization on the factory system, the domestic character of the industry being still retained. Thus, in the time of the Tsar Alexis Mikhailovitch, iron and bell foundries attained a certain degree of development. The government of Olonetz was the first seat of the native iron industry, now transferred to Southern and Eastern Russia. Gunpowder was then manufactured near Moscow; writing-paper and glass in the neighborhood of Moscow. But the great impetus was first given to native industry by Peter the Great, who conceived the idea of planting the arts and industries of Western Europe in Russia. It is well known how he labored himself in acquiring a practical knowledge of these arts in Holland and England. In Russia his efforts were untiring. He invited foreigners to come over, encouraged them to establish factories, protected these by all kinds of privileges, and, what was of the greatest importance, established government factories, to which villages were attached. The export of raw produce useful for manufactures was prohibited, the import of foreign fabrics limited. The Government became the chief buyer of the produce, often paying dearer than its value. Lastly, a separate college was founded for the encouragement and protection of manufacturers.

By the end of Peter's reign, Russia numbered 250 manufactories, including almost every known branch of industry at that time. But the measures taken to bring these into existence were of an artificial nature, and gave rise to monopolies, the evil effects of which were felt for the fifty years succeeding Peter's reign. About 1770, however, notions of free-trade made their way into Russia, and led to a reversal of the protective system. The privileges were withdrawn, the college of manufactures was closed, and the foundations laid of a more normal development. It was not, however, till about the middle of the present century that free-trade began to exercise a marked influence on Russian political economy, the tariffs of 1850, 1857 and 1869 having gradually adopted a more moderate scale of duties, better suited to the requirements of the country. Nevertheless, many years will probably elapse before the protective system is entirely done away with, for the artificially-created industries of Russia have obtained so firm a hold that any sudden change might cause wide-spread distress and financial derangement. . . .

If we would see something thoroughly Russian we must visit the forest region of the north—the governments of Archangel, Olonetz and Vologhda, where the population is chiefly occupied in one form or another with the wood industry. Russia, says Mr. Atkinson, is, as far as her arts are concerned, in the period of wood. In winter, with his *topor* or hatchet, the peasant enters the forest, fells the giant pine, the larch, the birch tree or white fir, drags the fallen log with his little pony to the stacking-place, there to be stamped by the receiver. In spring he rafts the timber down the smaller stream to its confluence with the great river, then down this to the sawmill or seaport. Large numbers of the population find employment and earn a livelihood in this way. The subsequent operations of sawing the round logs into deals, or squaring them for building purposes, is another branch of the industry. The villages in Great Russia are all built of wood. Some of the churches are of the same material, the best to resist the extremes of cold and heat of the climate. There is little room for the display of decorative art in these log-cabins; occasionally, however, the traveller comes to a village where the façades are adorned with carved roof boards, and the window frames and shutters sometimes gaily painted. These have a picturesque appearance, reminding one a little of the Swiss *châlet*. On internal decorations and fittings the peasant of Great Russia devotes little labor or taste. He is too much concerned with the struggle for existence to have a mind for the beautiful in art. Quite different is the Little Russian. He adorns his *mazanka*, or clay-hut, outside and in with flowers, and tastefully embroidered linen cloths disposed on the walls; but the Cossacks of Little Russia are distinct in language, habits, and dress from the Great Russians, so much so, indeed, as to form with these two nationalities.

The ndustrial art of the peasantry is chiefly religious. Pictures of saints, called ikons, painted on wooden blocks or copper, are familiar objects, seen in every Russian dwelling, from palace to log-cabin. These paintings are mostly sombre representations of the Virgin, our Saviour, or some saint, often covered with plaques of silver, silver-gilt, and even gold in some of the churches, leaving only the face, hands and feet exposed. A lighted lamp hangs before them on church festivals and saints' days. The preparation of the boards for these paintings is an industry of the government of Vladimir, the painting being done by hand in the monasteries. The method adopted is that of subdivision of labor; one set of monks paint the face, another put in the nose, a third the eyes, so that every feature is rendered in a particular style, which never varies. This is the height of conventionalism in art, and fully accounts for the absence of artistic merit in the ikon. The great sanctity attributed to some of these pictures is due to the miraculous legends surrounding them. For instance, over the sacred gate of the Kremlin at Moscow is a picture of the Redeemer of Smolensk, held in such high veneration that every one passing under it uncovers his head. The image of St. Nicholas of Mojaisk, of our Lady of Kazan, and many others, have all their legendary histories associated with some event in the life of the nation.

It would be interesting to follow up this subject, and trace the history of religious painting from the eleventh and twelfth centuries, when the monks of St. Athos produced a very similar type of sacred picture. Transferred to Russia, the art has remained almost unchanged, the stirring events in her history finding but faint echoes within the strong, fortress-like walls of the monasteries.

Mr. Morfill, the well-known author and reader in Slavonic languages at Oxford, classifies the different schools of ikon painting under the following heads: — (1) The Byzantine or Chersonian school; (2) the school of Moscow; (3) that of Novgorod; and (4) that of Strogonof. According to this authority, the first artists were of Greek origin, but they soon found Russian pupils. The models which had been received at Byzantium were faithfully adhered to at first, but gradually the art of ikonography acquired a different character in each part of the country. But M. Leroy-Beaulieu says that these schools were, strictly speaking, workshops, differing only in their treatment of the drapery and colors. The chief distinction I have noticed is that between the ikons of the old believers and those of the orthodox, the first having adopted a minature style of painting, and eschewing all representations of Christ and the Virgin.

In recent times, however, a more artistic style of picture has been produced by the aid of chromo-lithography, and at the Troitsa monastery, near Moscow, and the Pechersky Lavra, near Kief, large numbers of these new ikons are sold to the pilgrims.

The industries of cabinet and furniture making have flourished in the governments of Perm, Nijni-Novgorod, Valdimir, Viatka, Tver and Moscow, the furniture of Viatka being celebrated for its cheapness. This is not, however, a very flourishing industry at the present time. The Russian peasant's requirements in the way of furniture are of the simplest; a table and some benches are all that is needed. The only thing he buys is the *sunduk*, or iron-bound wooden trunk, sold in large numbers at all the great fairs.

Of the smaller articles in wood, there is a very large production of spoons, knives, forks and cups. The wooden spoon, Byzantine in shape, is indispensable in every household, for with this every peasant eats his food. These spoons are sent in large numbers to Central Asia, and with the samovar, or tea-urn, will in course of time help in civilizing the nomadizing Kirghiz, who now eat with their fingers. We should not omit to mention the important part that matting, made from the bark of the lime-tree, takes in the domestic economy of the Russian people. Of this are manufactured the bags to contain flour, grain, etc., the heaviest and best being those used for flour. The bark of the young lime-tree is stripped to make into sandals, and of these some millions of pairs are required, involving the destruction of an almost incredible number of trees. It takes the bark of four saplings to make one pair of sandals, and it is estimated that ten millions of pairs are required annually. The trees are stripped in spring and summer when they are full of sap. . . .

The iron industry ranks only second to that of textile fabrics in Russia. When I visited the mines and works of the Ural, some thirty years ago, Russia's iron trade was of no great importance. Prince Demidoff's and Monsieur Yakovleff's were then the only large works except those of the Government. At these charcoal iron of a high quality was rolled into rolls or hammered into thin sheets for roofing. The growing scarcity of forests, felt even in those days, has limited the production, and the chief seat of the iron industry is being transferred to Southern or New Russia, where iron-mines and coal-fields have been discovered. But the Ural range is rich in copper and the precious metals. Semi-precious stones, such as malachite, lapis-lazuli, aventurine, jasper and porphyry are found there. These are cut and polished in the government works at Ekaterinburg, and adorn the halls and galleries of the Hermitage, and other public buildings at St. Petersburg. The objects consist of vases, tables, paper-weights, etc., and are attractive, not so much for any novelty or elegance in design they may have as for the rarity and beauty of the stones, as well as for the immense labor expended upon them. The celebrated malachite doors, exhibited in London in 1851, are an instance of this stone-polishing art.

From recent statistics we learn that there were 522 iron mines in the Ural, in 1888, producing 49 millions of poods of metal; 20 mines in Southern Russia, with a production of 14 millions of poods; and 63 mines in Poland yielding 12 millions, total amounting to 87½ millions of poods, or nearly 1½ millions of tons of iron.

When I selected the subject of Russian industrial art for my paper before this Society, I had in view to say something of those village industries to which passing allusion has been made in the foregoing paper, and which I had seen in Little Russia, when I visited it in 1888. The so-called *kustarny promysl* in olden times gave employment to many families, and was not confined to one branch of industry, or to any particular locality, but comprised textile, ceramic

and other industries, and was widespread throughout Russia. Large manufactories and capitalists have put an end to it, but there still survive, in a few out-of-the-way towns or villages, some remnant of these by-gone industries.

It was in one of these old-fashioned places that I happened to find myself. The particular village to which I refer is Oposhnia, in the government of Poltava, a great cereal-producing region, and interesting from its having once been the border-land of Russia. It was here that the Cossacks fought against Tartar, Pole and Swede; this, too, was the country of Gogol, the great romance writer of Russia, and it was on these wide plains, now covered with waving corn, that Russia first became a nation.

The village of Oposhnia is a large one (according to old records it was a town as far back as the twelfth century) and numbers 700 houses at the present day, inhabited by the descendants of those Cossacks who fought under their hetmans, Daroshenko and Briukovetsky. These Cossacks, long since become peaceful settlers, turned their talents to the ceramic art. They are celebrated, too, as horticulturists. Nowhere have I seen more beautiful irises than were growing at the time of my visit in the chief magistrate's garden. Possibly, the Oposhnians have imitated the color of these flowers on their ware, for I noticed a remarkable iridescent lustre about their pottery which I have not seen elsewhere except in Spain. The clay they use is an excellent kaolin obtained in the neighborhood; this is fashioned by hand into the common dish in universal use in Little Russia, and known there as the *miska*. The design is simple, but effective: only three colors are used, prepared from metallic oxides, and laid on the revolving plate in concentric rings, with the aid of a feather fixed into a horn handle; the ground is afterward stippled-in by hand with a brush.

Professor Zankévitch, who has made a study of this art, says that he found no pottery to equal it except in Switzerland. I found some like it near Seville, but, whatever its origin, the art is one well worth preserving. Besides the ordinary ware of everyday use, the Oposhnia potter occasionally indulges a flight of fancy, and produces some original design, which usually takes the form of a drinking-vessel or bottle to hold spirits. These are curious rather than artistic in shape, though showing ingenuity and skill in the manufacture. . . .

A few more words on the future of Russian industrial art. We have seen how it has hitherto largely partaken of a religious character, jealously guarded and controlled by the priesthood and synodal authorities, how this art has become stereotyped or petrified through many centuries of imitation: how intercourse with the West has slightly modified the archaic type of ikonography, without, however, emancipating it from tradition. We have seen, too, how Western influences are pervading manufactures, and teaching Russia to make use of her immense material resources. Imbued with these Western feelings, a new school of art has sprung up. Sculpture, hitherto almost forbidden, is now taking a high position, and producing such works as those of Antokolsky, whose statue of Ivan the Terrible was exhibited some years ago in the Kensington galleries, and who has more recently modelled another historical subject, in the seated figure of Nestor, the annalist, of Lieberich and Lanceray, whose spirited groups of horses in bronze have been greatly admired. Among painters, too, there are already many known names, such as Vereschagin, the brilliant realistic artist of Central Asian life and landscape, Semiradsky, Malovsky, the brothers Sokoloff and a score or two more.

Stimulated by the exhibitions, held at frequent intervals in St. Petersburg and Moscow, and by the Stroganoff School of Design in the last named city, Russian art may have a future; but, whether inspired by the French or the Italian school, the subjects must be thoroughly Russian. They must depict in true colors native life and character, in every part of the vast and varied Empire.

WOMEN'S WORK IN THE WOMAN'S BUILDING. — EXHIBITS OF WROUGHT-IRON-WORK. — THE SPANISH AND MEXICAN EXHIBITS. — THE DANISH, NORSE AND RUSSIAN PAVILIONS. — THE JAPANESE TEA-HOUSE.

IN our last letter, we spoke of the pleasure and profit to be obtained from the serious study of some of the exteriors of the buildings. This study can be interspersed with the sight of much of architectural interest in the interiors.

In the Woman's Building, in the department devoted to work in decorative art, much that is admirable can be found, and one realizes, in looking at the examples here shown, what has been accomplished by woman in this especial branch of art. It is a kind of industrial art especially adapted to their use as a means of gaining a livelihood, and, with the thorough study which these designs bespeak, one realizes that before long there will be small chances for the class of half-skilled designers who in the past have been only too common in this country. The men will have to study hard to keep abreast of the women, if this be a fair sample of the work being accomplished by them throughout the country. Those who expected to find the woman's exhibit a fine assortment of log-cabin quilts and worsted embroideries have much to learn from this collection. Especially worthy of note are the designs for stained-glass in the north-eastern corner of the building. Some charming work is shown both in the designs and in the work as executed from them, both glass and designs far surpassing that shown in some of the foreign exhibits by firms that have a world-wide reputation. The glass here displayed is from the factories of some of our best-known producers, and shows that these designs of women are approved and appreciated by them. Near the exhibit of the designs for glass are several pieces of tapestry appropriate for wall-decoration. There is one very strong one, a copy from one of the illustrations of William Blake's "*Book of Job.*" The colors are extremely good and the mounting artistic, but it might be questioned how successful the handling of the mere technical part could be considered.

In the gallery of the building are displayed specimens of the embroidery of Madam Leroudier, about which the French architectural papers have spoken so well, while extending around one entire side of the gallery is a fac-simile of the famous Bayeux tapestries of Queen Matilda.

A good deal of wood-carving is displayed in the building which does not compare favorably with carvings from other nations, not accomplished by women, however, but by men who have devoted a lifetime to the art, and whose ancestors followed the calling before them, very likely. It is a curious fact that we, as a nation, do not seem to understand the treatment of wood as well as many another people. We finish our woods either with a polished piano-finish or else treat it merely with oil, which produces a greasy, unpleasant surface. This is especially noticeable by comparison when we come to the library in the Woman's Building, a really noble room, whose chief attraction lies in the beautiful wainscoting above the bookcases and in the mantelpiece. It seems at first sight as if this charming way of treatment had, at least, been appreciated, and the spirit of the sixteenth-century carving caught in a most surprising way. It was disappointing to learn, however, that this admirable work did not belong to to-day, but was taken from some old French convent or monastery of the sixteenth century. The report seems rather surprising, and it was impossible to verify it, but it certainly is not American work of the present day. Come from where it may, this library, which, by the way, is the New York room, is well worth careful inspection by all who are interested in architecture, either superficially or otherwise.

California, in this building, is represented by a room finished in most beautiful redwood. The room itself is not especially attractive, but the panels of the wood are many of them distinguished by great beauty. A curious design is employed for a frieze of the wood, on which, in neutral tints, are drawn in conventionalized shapes the trunks and sections of trunks of trees. The room does not pretend to be furnished, and seems only to be used as a display for the redwood.

Kentucky is represented by a really charming room, a reproduction of one of the apartments at the old Montecello homestead of Jefferson. All these rooms in the Woman's Building open out of a gallery that surrounds a really beautiful central court open to the glass roof. The building is sufficiently small to admit of such treatment, and the court is certainly a fine feature. Mrs. McMonnies has in the northern tympanum a fine decorative group, while the southern one is not so successfully adorned with a much less decorative composition with a vivid green background. Names of famous women form a frieze in gilt letters around the court, from Miriam and Esther of Hebrew days down to Jennie Lind and Rachel of our own time. Beneath the northern tympanum is the name of Bertha Honorè Palmer, while in the same position, at the southern end, is that of Sophia G. Hayden, the architect of the building. This is the only place in the grounds where the name of an architect has appeared raised in a place of honor. As the exterior of the building has not been considered above criticism, it would be no more than fair to state that the interior is especially satisfactory. The central court, hung, as it is, with the work of some of the best women artists of our century, is a very fine feature in building.

It is curious to note how the national characteristics impress themselves on work when one sees the displays from one nation side by side with others. Take, for instance, the architectural wrought-iron-work exhibit. In the French section of the Art Building there is some such work, whose design has been so carefully studied, whose execution is so painstaking, that it has, indeed, become a work of art. No crude nature, in the shape of flowers and leaves, has been introduced into it, but suggestions from nature have been gratefully received, and so studied and worked over that a most charming design has resulted for which we are very remotely indebted to the passion flower and vine. This is the only display of wrought-iron which the French seem to have made, and perhaps it is scarcely fair to compare this one excellent example with the very large collection which Germany has made. Certainly next in point of excellence to the French exhibit stands the German. This work is exceedingly good, but very different in design from the French. Nature is always beautiful to the German eye, and, consequently, black iron roses with painfully realistic thorns and leaves climb over lanterns, or poppies hang around chandeliers. Of course, such designs are

somewhat banished from the large wrought-iron gates, which form a very conspicuous and excellent object in the German exhibit. These gates are very satisfactory indeed, fine in workmanship and excellent in design, though, naturally, the work would not be of the some grade of finish of that in the one comparatively small French display. A few examples of this kind of work are found in the Spanish exhibit, and here, again, some of the national characteristics seem to be impressed on the work, there being a certain lazy slovenliness and pretentiousness both in the design and in the workmanship.

The entire Spanish exhibit is very disappointing. Out of grateful recognition to the king and queen who had such intimate relations with the Moors and whose times drew their chief artistic inspiration no doubt from them, a fine space was allotted in the Manufactures Building. Stories were current in the opening days of the Fair, when Spain seemed chiefly noted for her tardiness, of a fine pavilion which would be strikingly suggestive of the Alhambra. The pavilion actually consists of a series of heavy Moorish arches of rough timber construction painted or whitewashed in a pinkish tone. The sections which these arches surround are often empty to a somewhat noticeable degree, and form a most striking contrast to the large and superb collection of Great Britain, Germany, France and Italy, as well as to many of the most interesting small exhibits. Spain's architectural exhibit seems chiefly to be shown to prove beyond a doubt what are the things to be avoided in construction. Resting as she has for hundreds of years on the reputation which she acquired from the Moors in the use and make of tiles, it is really surprising what very poor specimens are displayed here, both in glazed tiles and tiles for floors. The designs are poor while the quality of the tiles themselves is much below our grade of excellence. Several specimens of a heavy composition stone are shown in the exhibit, used, apparently, chiefly in the manufacture of bath-tubs, making most unattractive looking articles. In the stained-glass, perhaps the one specimen, presents a little better work, though this but poorly compares with other exhibits. Naturally the work in the stamped-leather display is somewhat better, though even here one feels that a reputation is sometimes a dangerous thing to have. There is one very small exhibit of brick, hollow tile and roofing-tile, yellow and unglazed, which are well made and interesting on account of their peculiar size and shape.

It is noticeable that Mexico's exhibit, though at least excelling Spain's in the matter of enthusiasm, is characterized by the same features as those which mark, what might be called the mother country. There is a great deal in the general exhibit that is actual stuff, showing how far behind in thought and execution these countries really are. Some interesting old ecclesiastical carvings of the sixteenth century give one point of interest to the Mexican booth, and some beautiful slabs of onyx show out as an attractive natural product of the country.

Close neighbors in this southwestern corner of the Liberal Arts Building are one or two smaller exhibits worthy of passing notice. Jamaica has one generally uninteresting to the architectural eye, except for some very beautiful specimens of native woods.

Siam's gaudy and characteristic pavilion flares up as a near neighbor to this, being the same one used at the last Paris exhibition. All the exposed surfaces of woodwork are bright in red and gold, while the walls on the interior as well as exterior are composed of a curious checker-board inlaying of bits of glass and porcelain. This kind of decorative work is used to a great extent, even the risers of the steps having a strip inlaid in them. The exhibit itself is small, some little models of the famous Siamese house-boats as well as the ordinary dwelling-house being interesting.

Ceylon's banner is seen not far from this section of the building and here the chief architectural attraction lies in the beautifully carved columns.

In the Indian booth one side is composed of a series of three most exquisitely carved arches which would make a charming feature in certain rooms. Adjoining the exhibition booth is a very beautiful little Indian room in carved teakwood. A feature of this wood is that it is left in its natural color rather than stained as we generally see it. The entire room and carvings were executed in India, being brought here and re-erected. The carvings are all characteristic Indian work and are exquisite in design and workmanship. The whole thing is elaborate in the extreme, being one complete mass of carving, much of it of the finest and most beautiful character. To take away what might otherwise be a flat effect and also to accentuate the architectural features, large portions of the carvings are ingeniously arranged so as to appear to be over an inch in depth.

Denmark's pavilion also contains a room equally if not more typical in character. The furnishings and finishings are all in the style of the Middle Ages. The walls are finished with a high wainscoting, and above the tapestry. The wainscoting of black oak is in narrow panels, a small carved panel above each of the narrow ones, the background behind the carvings being relieved by a layer of gilt and red color. The design of the tapestry is good and very much in keeping with the character of the room, with the exception of the lower member, which is perhaps more classic than mediæval. Tables, chairs and settle are all exceptionally good and carry out in detail the general feeling of the room. The upholstering of the settle is well managed as the stuff hangs from the top of the high back by rings.

The entire Danish pavilion is well and carefully managed and bespeaks much care and thought in the planning. It follows out no special style of architecture except the wooden construction in vogue in modern Denmark. On either side of the entrance, small rooms are devoted to museums for relics belonging to Anderson and Thorwaldsen, while the whole pavilion seems almost like a shrine for Thorwaldsen's works. Life-sized casts of Anderson and the sculptor stand either side of the entrance, while the arched spaces in the walls of the pavilion are casts of many of Thorwaldsen's chief works.

A little to the east and south of Denmark, Norway has her pavilion, which is in a design very characteristic of the country. The treatment of the wood is somewhat similar to that in the Danish building, the wood, however, here, being left in its natural tone while bright color is introduced. The treatment, though, is more barbaric and less refined, being a connecting link between the peculiar wood treatment of Denmark and the more exaggerated style of Russia. Norway's pavilion though comparatively small is very effective: at the back is a platform behind which rises painted views of the Norwegian mountains, fjords and glaciers, etc., which are themselves the background for a small Norwegian peasant's cottage, while on the platform are wax figures of peasants in the national dress. One of the most attractive features of the exhibit is the beautiful wood-carving. The designs are of a refined Romanesque type, and the manner of treatment of the carving itself is as refined as the manner of treating the style.

Russia's pavilion stands just north, and the general outside appearance would bespeak much of interest within. The wood is stained a walnut shade, while gilt decoration is introduced here and there through its grotesque outlines. The pavilion was designed by one of the most distinguished Russian architects and fully exemplifies the eccentricities of the national style. The entrance is through a little vestibule, whose ceiling of a curious woven stuff shows a design of the double headed eagle, while a large mosaic portrait adorns its walls. Stained-glass windows of poor design and workmanship still further ornament this small vestibule. The entire exhibit is typical of the country. Rich and beautiful enamel-work in gold is displayed most lavishly, so lavishly in fact that the uninitiated begin to suspect it must have a comparatively moderate price till told that a small vase is worth a thousand dollars. Great lapis lazuli and malachite urns and tables are there, but almost nothing is exhibited that could appeal to a well-to-do educated middle class, or bespeak any activity in industrial art or comfort in home-building. There is absolutely no architectural display of any kind. There are a few pieces of ironwork, one essentially architectural, a holder for a banner, which is very good in design. This example harmonizes more with our ideas of how architectural ironwork should be treated.

Belgium's display has small architectural features of interest. Her glazed tiles and mantel with ceramic work and tile picture at least deserve a passing glance, the ceramic-work mantel perhaps more than a passing glance, that it may sufficiently impress itself on one's memory as something henceforth always to be avoided. The marble display in this exhibit is quite a large one, comprising seventy-five different kinds, while the glass display is disappointing. Of course, an exhibit of plain window-glass would be tedious and uninteresting, and the amount that is there is quite sufficient to represent an industry for which Belgium is famous, but the few pieces of stained-glass that are there are very poor and not at all up to the standard of excellence which one would naturally expect.

One interesting little spot is found in the Japanese tea-houses on the shores of the lagoon. Incidentally these have been mentioned before in these letters, while they were in process of construction. One, at least, is presumably an exact counterpart of the ordinary tea-house in Tokio. The open tea-house is built entirely of bamboo. Three small bamboo stalks, suggestive of ordinary fish-poles are tied together and these serve for ridge poles. The roof itself is of split bamboo laid together like Spanish tiles. The walls, of segments of bamboo bound together by bamboo strips, harmonize with the window openings covered with bamboo gratings. The tables and little stools (an innovation no doubt) are of bamboo and very pretty and comfortable of construction. Across the tiny garden, a little Japanese house offers, at an advanced price, the hospitality of tea, and here one can be still more Japanese and sit on the floor and drink tea with a lady hostess. This second little building is evidently in its chief characteristics like the ordinary Japanese dwelling, paper partition-walls and all, and tinyness and prettiness come out as strong points here as in the descriptions of these peculiar little dwellings. The back-door opens from what is presumably a small kitchen as a diminutive charcoal stove or brazier stands in the corner. The walls, both inside and out, are practically covered with a peculiar paper, which in texture is like our sand-paper, though in color it is between that and emery paper. The rooms are really very pretty, being dainty and restful after our crowded apartments.

A great feature of the establishment is the garden about large enough to accommodate an ordinary-sized family of English sparrows. Leading to what we call back-door and kitchen (possibly it may be an antechamber) is a diminutive walk made of tiles sunk in the earth, about a foot apart. By the side of this door, in a little hollow lined with stones and the curious resurrection plant, rests a small gnarled tree-trunk on which is a bronze urn, filled with water. Across the urn lie two curious little long-handled wooden dippers. Whether this vast fountain is intended for watering the lawn or supplying the family with cooking-water is not shown. By the front of the house a more pretentious, though similar "fountain" is found,

across the top of which several blue flag plants are laid. Everything seems most decorative and as if it had just stepped off a Japanese fan. The small elevated humps in the garden support elaborate porcelain affairs in which lights are evidently burned in the evening. Everything about the place is planned and executed with the greatest care. Even the small wooden signs which direct one to the separate tea-houses have absurd little slanting roofs built over them, the whole sign, roof and all, not being a foot square.

SOCIETIES

AMERICAN INSTITUTE OF ARCHITECTS.

THE Annual Convention of the American Institute of Architects is to be held in the new Memorial Art Institute, on the Lake Front in Chicago, in the week beginning July 31, 1893, and the Grand Pacific Hotel has been selected as the headquarters of the Institute of Architects during the Convention. It is therefore desirable that as many members as possible be accommodated at this hotel. Application for rooms should be made at once, and all applicants should give at least ten days' notice of their intended arrival, in order to be sure of securing good accommodations.

The Grand Pacific is conducted on the American plan only; is but a short distance from the Art Institute, and is only four blocks away from the station where the trains start for Jackson Park, the site of the Columbian Exposition, making the run without stopping in fifteen minutes.

Rates per day, including board, are as follows: Single rooms, \$4.00 to \$5.00; same, *with bath*, \$5.00 to \$6.00. Double rooms, one person, \$6.00; two or more persons, \$5.00 each; double rooms, *with bath*, one person, \$7.50; two or more persons, \$5.00 to \$6.00 each.

These prices, I am informed, are as low as the lowest in the city for the same class of accommodations, and will doubtless be cheaper than a \$3.00 room in a temporary building near Jackson Park, with the added expense of obtaining meals elsewhere.

I am authorized to announce that rooms can be obtained for one person in a single bed, with two or three in a room, for as low as \$1.00 per day, and that the management of the Lakota, a new ten-story fireproof hotel, on the corner of Thirtieth Street and Michigan Avenue, about midway between Jackson Park and the Memorial Art Institute, has agreed to accommodate the architects who prefer the European plan, at the rate of \$1.50 to \$4.50 per day.

The local Committee, consisting of Messrs. W. W. Clay, 218 La Salle Street and S. A. Treat, 58 Wabash Avenue, will, if desired, undertake to secure quarters at the Lakota or elsewhere, as far as in their power, from \$1.50 to \$5.00 per day, on the European plan, if they have timely notice of the same, stating the time of proposed arrival, length of contemplated stay, and the price which the members are willing to pay.

I am able at this time to announce that the following papers have been promised for presentation at the Convention:

ON THE COLUMBIAN EXPOSITION.

Daniel H. Burnham. — Story of its Organization.
Frederick Law Olmsted. — On the General Scheme and Plans.
E. C. Shankland. — On the Construction of Buildings, Docks, Piers, Bridges, etc.
W. H. Holcomb. — On the Use, for Transportation, of the Lagoons, of Lake Michigan, of the Intramural Railway, of the Alley Elevated, of the Great Trunk Lines, of the Terminal Facilities, of the Chair System, etc.
Charles F. Foster. — On the Mechanical Power Plant.
R. H. Pierce. — On the Electric Plant.

ON SUBJECTS OF GENERAL ARCHITECTURAL INTEREST.

Frederick Baumann. — A Review of Chicago's Architecture.
L. De Coppet Berg. — Engineering in Architecture.
C. H. Blackall. — The Influence of Building-laws upon Architectural Development.
A. J. Bloor. — Ethics in Architecture.
Glenn Brown. — A Review of Recent Plumbing Practice.
T. M. Clark. — Association for Mutual Defence.
Thomas C. Clarke. — Architectural Engineering.
R. W. Gibson. — Superintendence in Architecture.
William R. Hutton. — Foundations of Buildings.
Jeremiah O'Rourke. — Government Practice.
Edward T. Potter. — The Aeration of Cities and their Buildings.
J. L. Smithmeyer. — Library Buildings.
Henry Van Brunt. — Some Considerations Affecting the Development of Characteristic Style in the United States.
H. Langford Warren. — On the Use of Color in Architectural Design.
P. B. Wight. — Fireproof Construction and the Practice of American Architects.

I wish to urge upon every member his loyal duty to attend the Convention, not only as host, to contribute to the pleasure of such foreigners as may honor us with their presence, but his duty to himself and to his *confrères* to make the Convention worthy of the opportunity and the occasion.

All persons proposing to attend will please notify the Secretary at as early a date as possible, in order that additional arrangements may be made, if necessary, for their accommodation.

ALFRED STONE, *Secretary, A. I. A.*

THE ILLUSTRATIONS

[*Contributors are requested to send with their drawings, plans and a full and adequate description of the buildings, including a statement of cost.*]

HOUSE OF T. E. PROCTOR, ESQ., 273 COMMONWEALTH AVE., BOSTON, MASS. MESSRS. HARTWELL & RICHARDSON, ARCHITECTS, BOSTON, MASS.

[Gelatine Print, issued with the International and Imperial Editions only.]

CHURCH OF THE GOOD SHEPHERD, ROSEMONT, PA. MESSRS. BAILY & TRUSCOTT, ARCHITECTS, PHILADELPHIA, PA.

THIS church, of which the corner-stone was laid June 17, 1893, is being erected at Rosemont, Pa., as a memorial to the late Mrs. H. B. French by her husband. It is being built of a local blue-gray stone with Pennsylvania blue marble trimmings, the interior being faced with the same local stone. The stone is laid rubble range with deep sunk joints. The roof will be of blue slate; the pillars and arches of the interior, Indiana limestone; the roof open-timbered with hammer-beam trusses; the chancel ceiling moulded and panelled for decoration. The seats, chancel furniture, etc., will be of oak; the chancel floor and vestibule tiled. It is proposed to make the windows memorials. Steam, indirect system, will be used eventually for heating. Provision is made for ventilation by means of large duct in tower. The seating-capacity is five hundred. The cost will be about thirty thousand dollars.

THE NEW TELEPHONE EXCHANGE BUILDING, ATLANTA, GA. MR. G. L. NORRMAN, ARCHITECT, ATLANTA, GA.

THE building is used exclusively by the Southern Bell Telephone & Telegraph Company. It is built of Ohio sandstone and Perth Amboy buff-brick and terra-cotta, and in execution proves to be a most pleasing architectural conception.

COMPETITIVE DESIGN FOR FIRE-STATION, CAMBRIDGE, MASS. MR. JAMES MURRAY, ARCHITECT, BOSTON, MASS.

ROOKWOOD POTTERY, CINCINNATI, O. MR. H. NEILL WILSON, ARCHITECT, PITTSFIELD, MASS.

HOTEL YORK, YORK, PA. MR. J. A. DEMPWOLF, ARCHITECT, YORK, PA.

[Additional Illustrations in the International Edition.]

XVI, XVII AND XVIII CENTURY KEYS.

[Copper-plate Photogravure.]

THESE keys formed a small fragment of the famous Spitzer Collection which has recently been dissipated over the civilized world by one of the most profitable sales ever held.

DOORWAY TO HOUSE OF T. E. PROCTOR, ESQ., 273 COMMONWEALTH AVE., BOSTON, MASS. MESSRS. HARTWELL & RICHARDSON, ARCHITECTS, BOSTON, MASS.

[Gelatine Print.]

THE COTTAGE, WALTON HEATH, SURREY, ENG. MR. B. VAUGHAN JOHNSON, M. A., ARCHITECT.

THIS is an addition to, and rebuilding of, an old house. The materials of the new part are red bricks and tile hangings, the stonework being in Monk's Park and Corsham stone. The joinery in the hall and billiard-room is in oak.

UNITED PRESBYTERIAN CHURCH, WEST CALDER, N. B.

OUR illustration shows the village church which has been built from the design of Mr. James G. Fairley, F. R. I. B. A., architect. A water-color drawing of it was exhibited in the Royal Scottish Academy this year.

NEW COMMERCIAL PREMISES, LIVERPOOL, ENG. MR. W. AUBREY THOMAS, ARCHITECT.

THIS building is proposed to be erected in Water Street, Liverpool, and will be adapted for large, well-lighted offices suitable for shipping firms. The staircase, which is to be of stone and of circular form, encloses a hydraulic passenger lift. The walls of corridor and staircase will be tiled. The front elevation is to be of Cefn stone, with granite bases.

COMMUNICATIONS.

[*The editors cannot pay attention to demands of correspondents who forget to give their names and addresses as guaranty of good faith; nor do they hold themselves responsible for opinions expressed by their correspondents.*]

TRINITY CHURCH TOWER ROOFS.

BOSTON, MASS., June 24, 1893.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — As one of the editorials in to-day's *American Architect* is somewhat amusing, I thought I would write to you and state a few facts.

It says that "Not long before his death Richardson made a vacation trip to Europe with some of the richest members of Trinity congregation," etc., and then goes on to say that "He deserted his friends on some excuse and returned to Boston, and immediately had the roofs taken off of the towers to carry up the walls." It also says: "Unfortunately, these gentlemen had thought better of the matter in the meantime," etc.

In 1882 Mr. Richardson decided to go to Europe, and asked me to go with him, which I did, and to the best of my recollection, he did not take a meal or pass a day out of my presence. He may have once or twice, but I do not remember it.

Who the rich members of Trinity parish were I cannot conceive. Rev. Phillips Brooks, Rev. Mr. McVicker, of Philadelphia, an intimate friend of Mr. Brooks, and the Rev. J. P. Franks, of Salem, also an intimate friend of Mr. Brooks, went to Europe at the same time, and, as we went over in the same steamer, we joined forces on leaving London and travelled together through France and Italy.

As I remember, Mr. John C. Ropes was also a passenger on the steamer, and the only member of Trinity parish that I can recollect at the present time, and we only saw him while on the Atlantic.

On leaving Italy, Mr. Richardson and I went to Spain, leaving the three ministers to themselves, and from Spain we went to Paris, and then to America. The reason for his coming home was that he had been away more than four weeks longer than he had laid out at first, and he was afraid that his clients would complain if he stayed longer.

In Milan, some time in early August (I should say), he gave a good deal of time to the study of the Albany Cathedral, and had a long correspondence with Bishop Doane on the matter, but I do not recollect hearing the towers of Trinity Church mentioned in any way. Possibly he and Mr. Brooks may have talked the matter over, as they had long talks in the evening.

In regard to Trinity Church, my recollection of the days in the office is that the two steep roofs were tiled, and that the tiles broke badly and dropped off, and the roof leaked, and, as they were never liked, it was decided to take them down and put on a flat tin roof, which would probably stay tight until such time as the roof should be altered.

I write this long letter to you merely to show you how curiously an editorial sometimes strikes those who are more or less interested in the subject-matter. I am sorry to spoil the article, which is interesting if not true. I never before was taken for a rich member of Trinity parish. Yours very truly, H. J.

[WE gave the story only as it was told to us, and having seemingly blundered through overtrustfulness we think it well, in the interest of truth and accuracy, to publish this note, though it was not written in that intention. — EDS. AMERICAN ARCHITECT.]

ASPHALT ROOFS: VAULTS.

——, June 19, 1893.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — I would be very much obliged to you if you would kindly answer the following questions in your next issue:

First. — Is an asphalt and gravel roof the best for flat roofs, and if so what is the best manner of laying it.

Second. — Are there any books describing the practical building of modern fire and burglar proof vaults, if not what is the best and most usual manner of building them at the present time.

Yours truly, F. W. M.

[ASPHALT and gravel roofs answer very well for flat roofs north of New York. In New York, and farther south, they are not so popular, apparently, for the reason that the sun, in the lower latitudes, melts the asphalt, which then drains down to the lower parts of the roof, leaving the upper portions denuded of their protecting coating. They are made with two, three, four or five "plies" of felt, according to the durability desired for the roof, and the number of "moppings" of asphalt is also generally specified. For a good roof, two layers of asphalted felt are put down, and secured with nails, driven through large tin washers, and the whole is then "mopped" with melted asphalt; then follow more felt and more moppings, three moppings being usually given to a four or five-ply roof. After the last mopping, small water-worn pebbles are scattered over the surface, to a depth of half or three-quarters of an inch. Before the laying of the felt is begun, "edge-cleats," of zinc or copper, high enough to keep the gravel from washing off, are put around the edges, and the gutter is usually formed with a similar cleat, to prevent the gravel and asphalt from running into it, and angles are flashed with zinc, or lead, or both, well covered with asphalt at the junction with the roof.

2. There is no very modern book that we know of on vault-building. The business is a specialty of the great safe-builders. Their catalogues and circulars contain much information on the subject, adapted, of course, to their own particular methods. Ordinary fireproof vaults are often built with hollow walls, generally two 8-inch walls with an air-space between, floored with flagging on iron beams, and covered with the same, or with bricks, and doors hung to iron frames, which can be bought ready-made of the safe-makers, are built in. With a good foundation, this makes a tolerably fireproof vault, but it will not resist burglar's tools. A burglar-proof vault is a very difficult matter, comprising iron and steel linings, etc., for which the safe-maker's aid must be called in. — EDS. AMERICAN ARCHITECT.]

NOTES AND CLIPPINGS

THE MASSACHUSETTS SMOKE-PREVENTION LAW. — The Massachusetts smoke-prevention law, which takes effect July 1st, applies only to Boston, being limited to cities of over 300,000 inhabitants. The law provides that no person shall in such a city after July 1st use bituminous coal for steam-making, unless the furnace is so built or equipped that at least 75 per cent of the smoke is consumed, "the degree of suppression being determined by the quantity of such smoke emitted, as shown by the density and color of the issuing smoke and the length of time which it is visible, the maximum standard of comparison being a continuous discharge of dense, dark smoke during the time the furnace is in active operation." An officer charged with the enforcement of the law is to be appointed by the Mayor, and a penalty of $10 to $100 is fixed for each week of violation. — *Engineering News.*

RETIREMENT OF SIR P. C. OWEN. — Sir Philip Cunliffe-Owen, to whose energy and excutive powers the South Kensington collections owe much, is about to retire from the directorship, owing to the closure of his term of office. He has served since 1873. The science department is to be separated from the art department, the directorship of which has been offered to and accepted by Prof. J. H. Middleton, director of the Fitzwilliam Museum at Cambridge. — *Exchange.*

TRADE SURVEYS

IT is difficult, in the face of the news from India regarding silver, to avoid a brief reference to a hackneyed topic. The combination of financiers and governments against silver does not end by the contest when it is determined to cease coinage. That, in fact, merely opens the question between financiers and people, merely appeals the question to a higher — the highest court. The crusade against silver has been no spasmodic work. The financial generals of the world have long since seen the trend of events. If human nature is not false to itself, we are on the eve of an agitation that will not terminate until radical changes are made in financial methods, ideas and standards. The people at large have never yet been heard on the question. The occasion has never yet arisen squarely. It now looks as if the issue could not be deferred. The United States Government must either fall in line with all other nations or take the consequences. It is not difficult to see what its course will be at the outset, but it is difficult to forecast the result, because the heretofore silent factor — the people — will now enter the problem, and, right or wrong, their views will prevail. The general business of the country is sound, which is a remarkable statement to make, considering that there is no market for the commercial paper of the best mercantile houses, or even of railroad companies. The drain of money westward has been at the rate of one million dollars per day. The surplus reserve is one-fourth of what it was a year ago. Loans in New York banks have decreased in that time in the ratio of 50 to 40, deposits 54 to 40, and reserves in banks have fallen off one-third. Our excess of imports in eleven months is $81,000,000, as against excess of exports same time last year of $210,000,000. Our gold and silver exports for same time was $100,000,000, against $31,000,000 same time last year. Taken in connection with declining values, increasing failures, strained banking facilities, affected credits and general apprehension, it is not surprising that the shrewdest minds in the business world refuse to believe that the worst is over, daily dinned into their ears by twenty-dollar-a-week financial writers. The present conditions are the outcome of twenty or thirty years' unobserved accumulations, and no temporary increase in wheat exports or expansion of exports for a month or two will help much. Powerful interests have determined that silver shall be discredited, and that gold shall be the unit of value the world over. The plodding masses will in due time take up the challenge. Railroad earnings for the first week in June showed increase of 5.75 in gross earnings over same week last year, and, second week, 3.09 per cent. Railroad track-laying begins in two weeks on several systems. Reorganization of a number of railroad properties is going on favorably; but the Reading plan is a failure, because of the fact that enormous pickings would go to the controlling financial agencies. In the industries, the reports for the week are favorable, though there is some just complaint of business held back because of scarcity of money or difficulty of obtaining credit. Producing interests have had the momentum of an active winter and spring to carry them over depressing conditions, but that momentum is now pretty well exhausted, and orders are slackening up for forward delivery. Consumptive requirements have not declined perceptibly, as railroad traffic and bank clearings show. Builders report for June increasing activity, and say that building material is strong. Shop and factory work has not fallen off; the shelves of retailers are not overstocked; credit is not being strained, because retailers refuse to go beyond their means. Commercial failures are uncomfortably numerous, but the fact must be kept in mind, the bulk of these failures are of those who hang on the edge of commercial existence, whose disappearance will not be much missed. Legitimate business has always been hurt by aspirants lacking important requirements. There is no inclination in manufacturing circles to make beyond orders. Even large stocks are not desirable. In some quarters a hardening tendency in raw material is looked for, but in trade circles there are no changes that way. Throughout the West there is much unrest, because of the uncertainty of always being able to promptly draw financial assistance from the East, the needs there are so much greater than usual. Jobbers at New York do not report much change in buying over last year. The commercial agencies report increased difficulty in making collections. A vast amount of commercial paper is coming due, and its renewal or extension is the only thing the banks can do, unless a general panic is precipitated — at least, so write the representatives of borrowers. The pressure is increasing and the sky is blacker, but there is even now no good reason for anticipating any but a happy deliverance from threatened woes.

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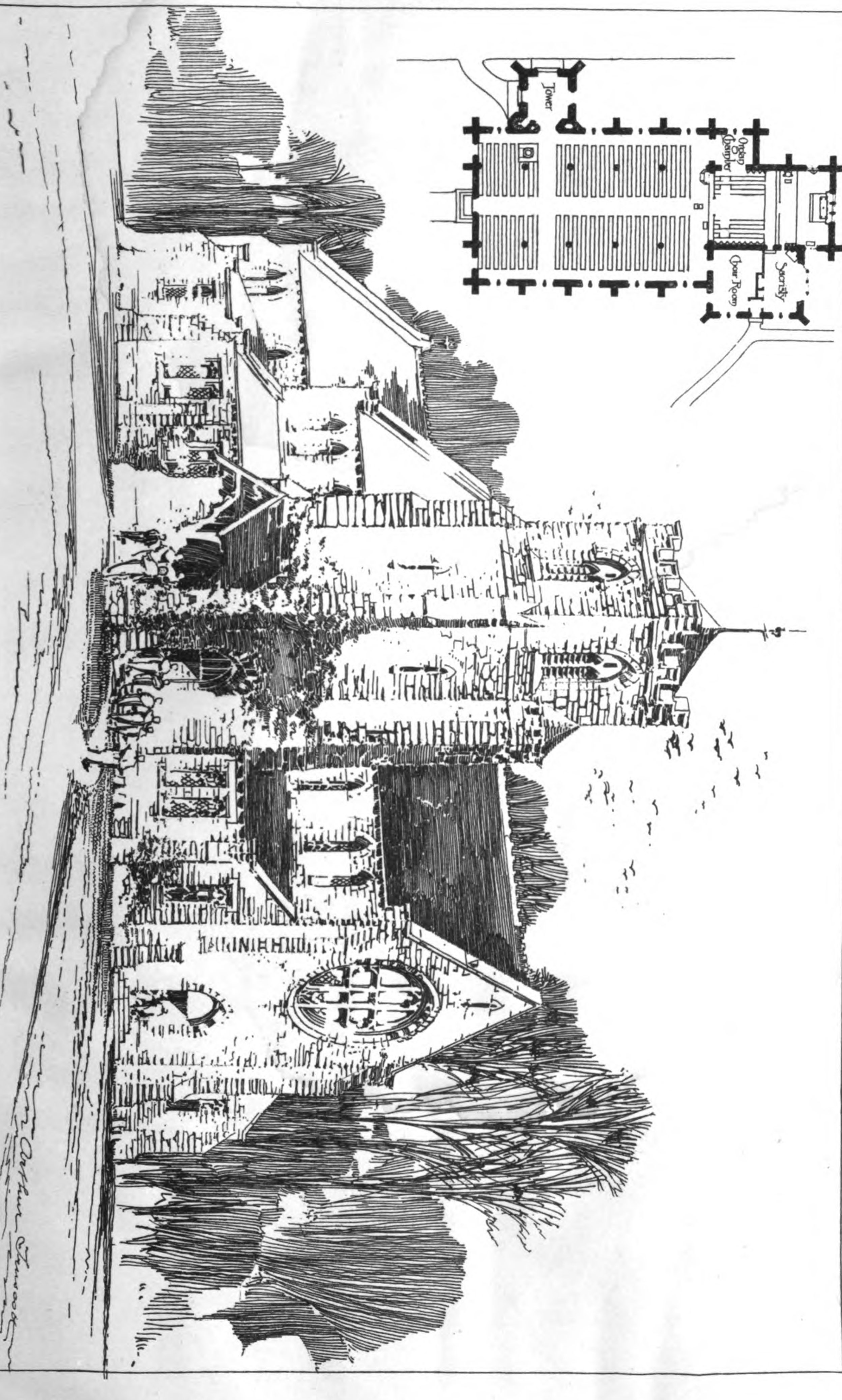

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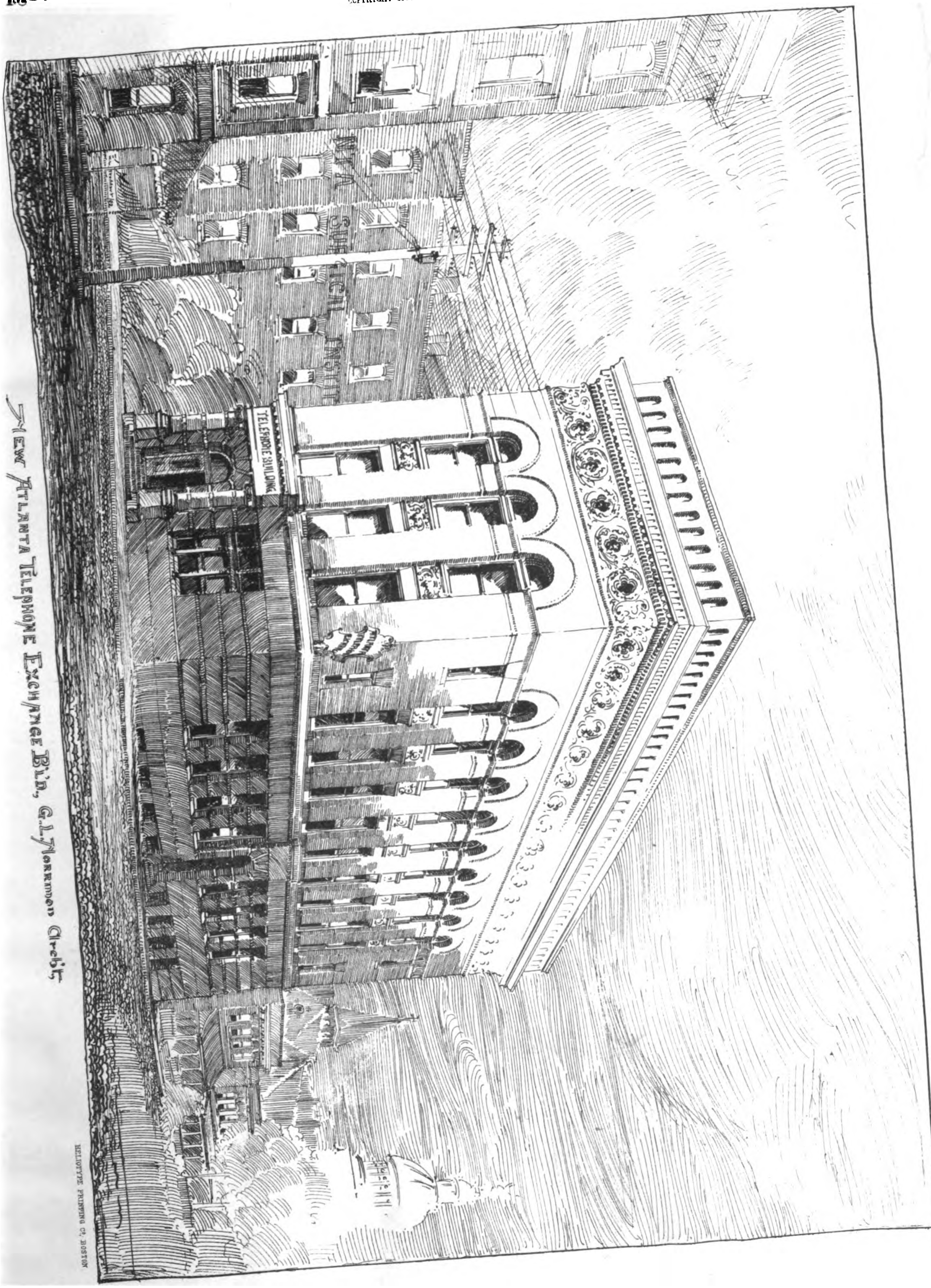

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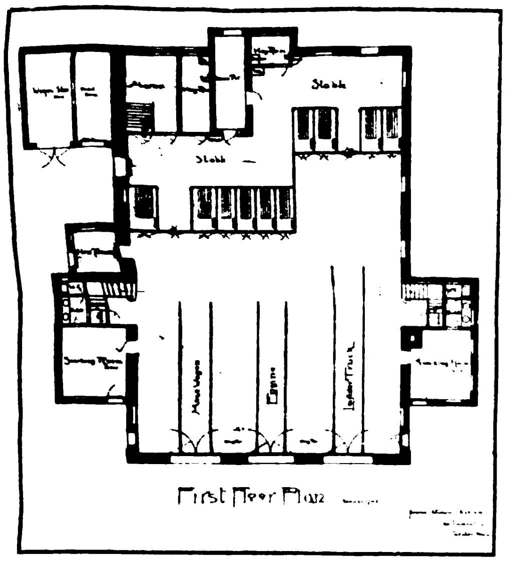

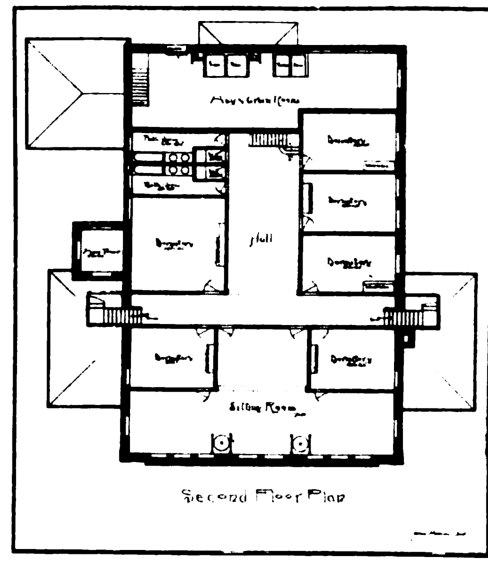

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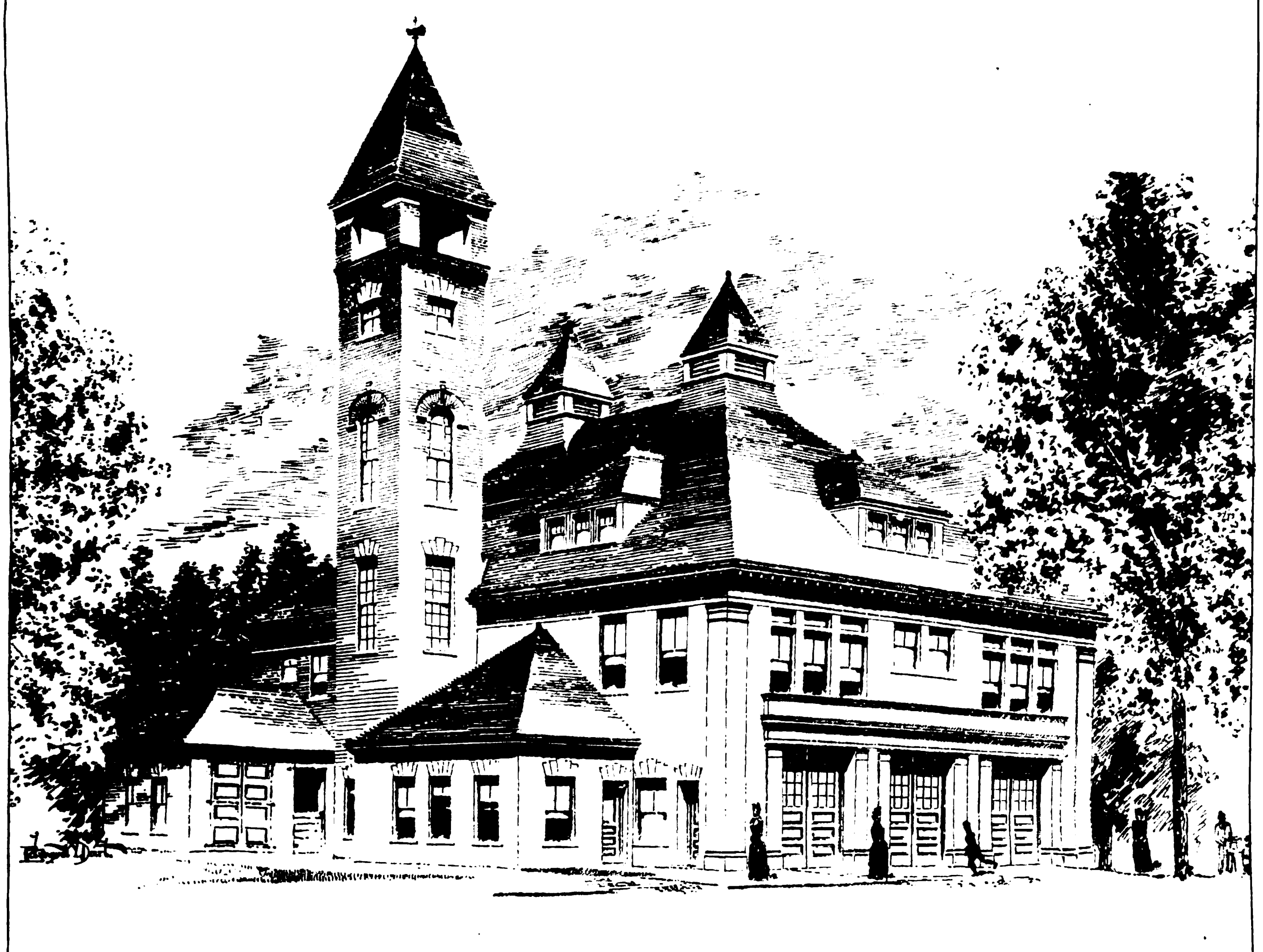

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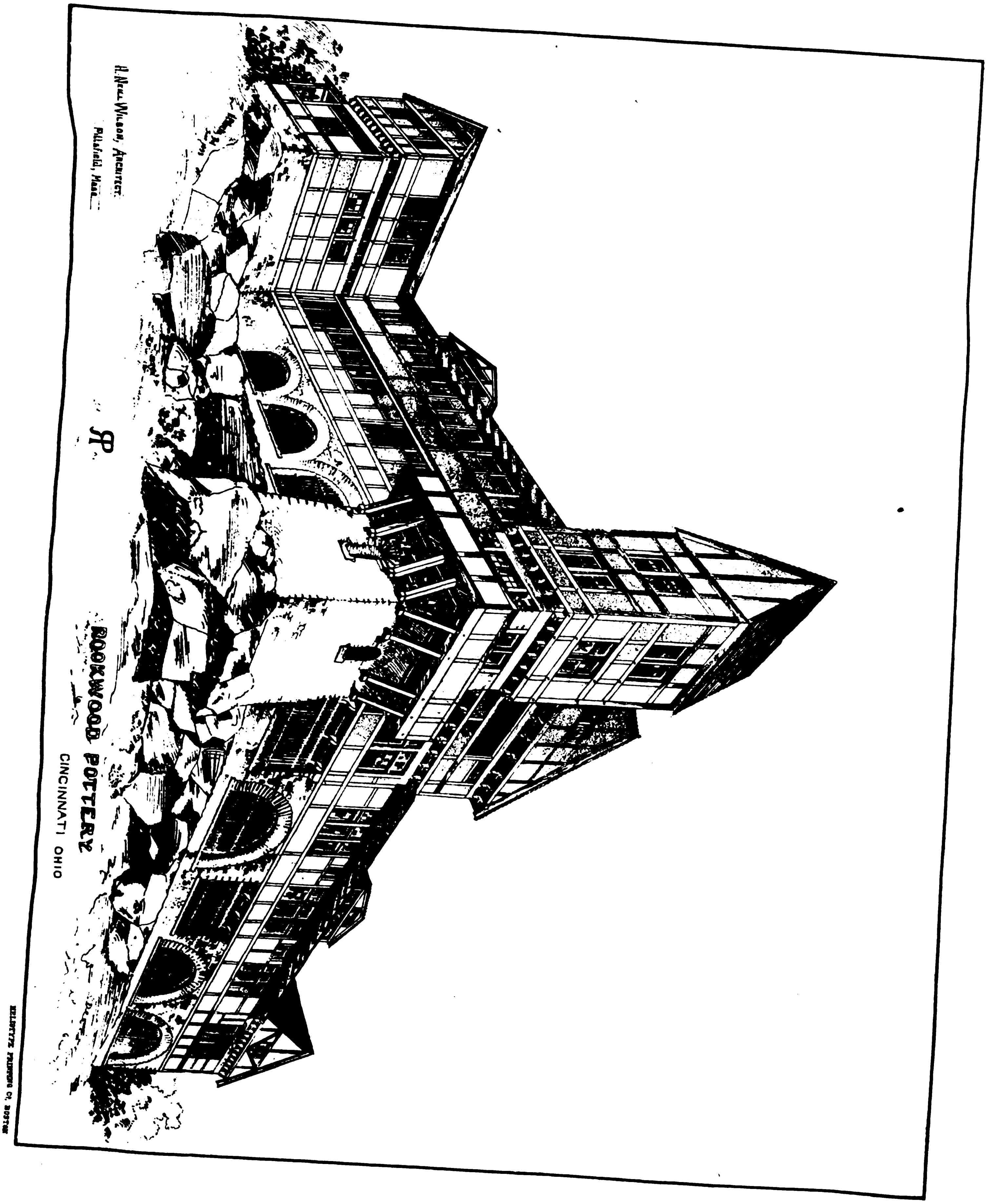
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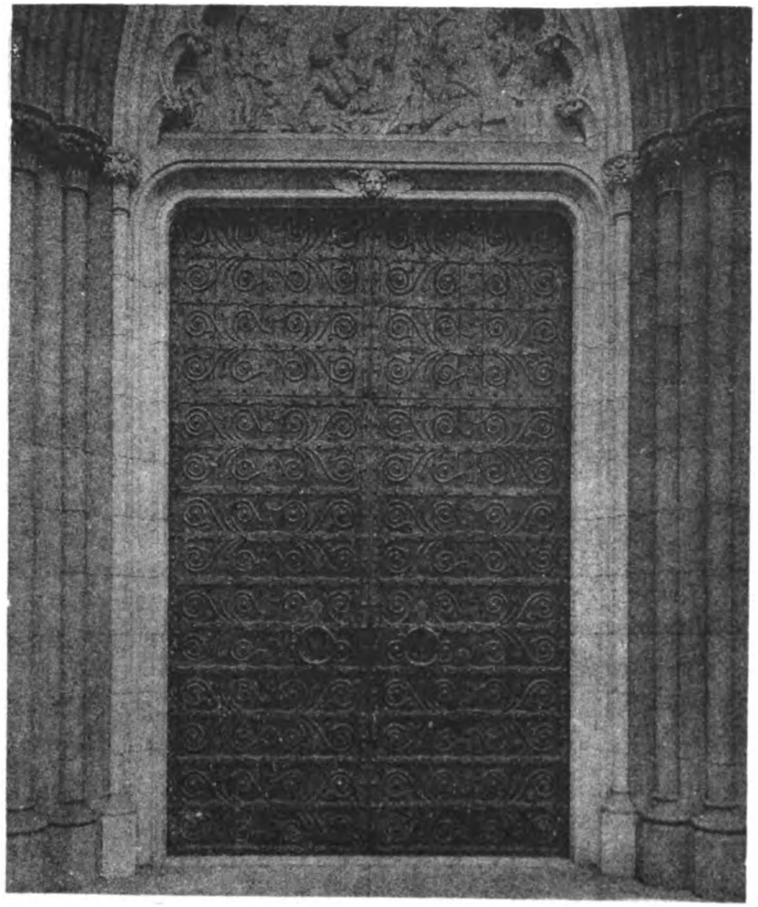

DOOR ORNAMENTATION, GRACE CHURCH, NEW YORK.
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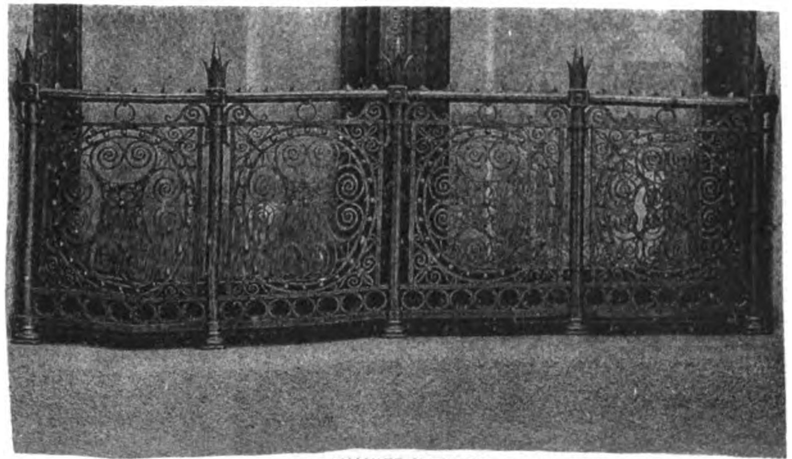
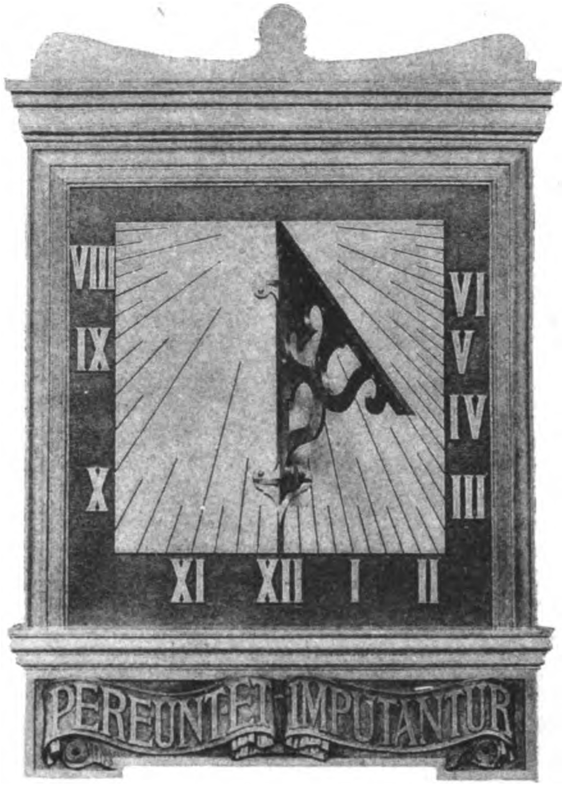


WINDOW GUARDS, MECHANICS NATIONAL BANK, NEW YORK.



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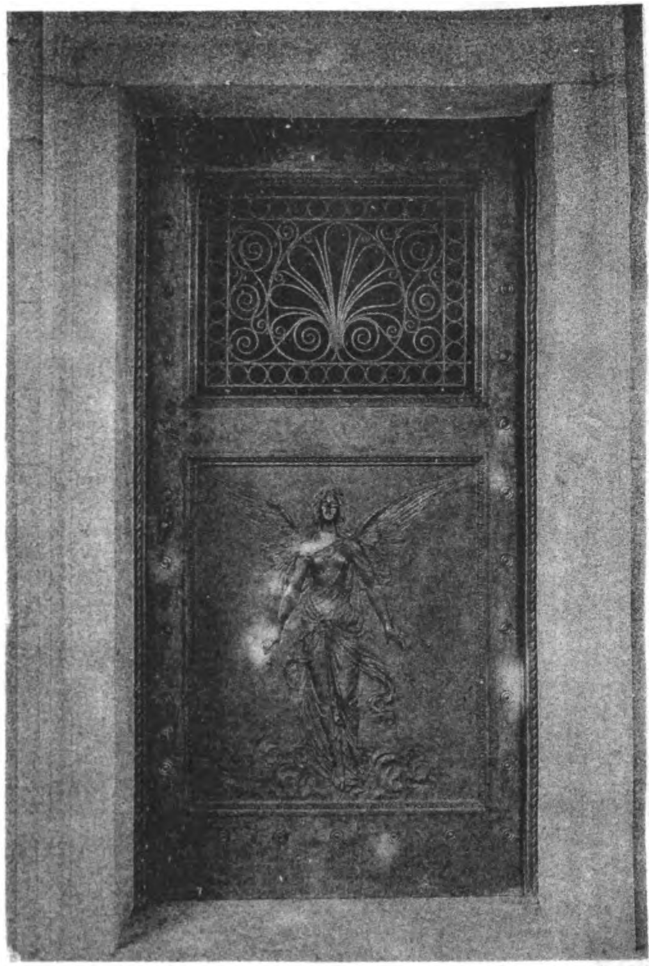

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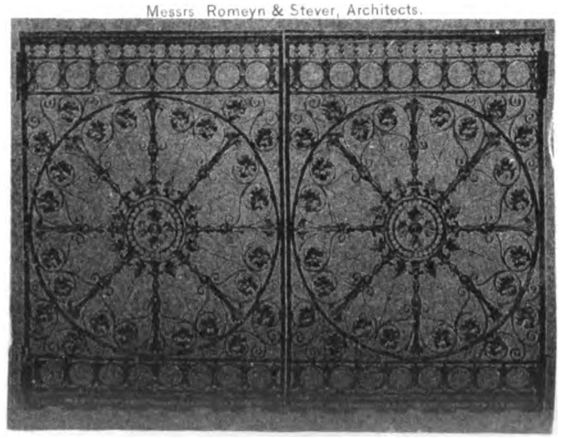

GATES, MUTUAL LIFE INSURANCE CO. BUILDING, NEW YORK.

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JULY 8, 1893.

CONTENTS

MR. CHARLES GRAHAM, an old and well-known builder of New York, died recently under rather affecting circumstances. For many years Mr. Graham had been prominent in New York building affairs. He was a Scotchman by birth, and trained as a stair-builder. We need hardly say that a good stair-builder of the old school had to be a man of unusual intelligence, and of considerable training in geometry, and Mr. Graham found in New York, after his arrival there in 1851, employment and advancement. In 1865 he established the firm of Charles Graham & Co., which went into business first as stair-builders, but afterwards took up general contracting. As contractors, the firm built the beautiful Holland House on Fifth Avenue, the Buckingham Hotel extension, and private residences for Mayor William R. Grace, and Mr. Sidney Dillon. Like most men of intelligence and resolution, Mr. Graham had strong convictions on political matters, and, during the early days of the Civil War, he devoted himself earnestly to the cause of the slaves, many of whom he secretly assisted to freedom, while he defended them in public through the columns of the *Tribune*, with whose proprietor, Horace Greeley, he was on intimate terms. Mr. Graham's life was, in general, happy and prosperous. He had five children, two sons and three daughters. One of his sons was in business with him, and the only serious sorrow of the family was connected with the other son, who disappeared from home twenty-four years ago. Three months ago, Mr. Graham's wife died, and, almost at the very moment of this bereavement, an envelope arrived by mail, addressed to Charles Graham, and containing a photograph of a pretty little girl, marked "Your grand-daughter, Alice Graham." There was no address or post-mark on the envelope, but Mr. Graham followed up the faint clue with characteristic energy, advertising extensively over the country, and was at last rewarded by finding his long-lost son, who, though ill and wretched, had strength enough left to reach his father's house, where he died in peace a few days later, leaving his little daughter to her grandfather's care. The agitation of all these events was, however, too much for Mr. Graham, and within two weeks he followed his wife and son to the grave.

THE Annual Report of the City Architect of Boston, which has just been issued, forms an attractive and useful little book. It is a satisfaction to see such skilful and artistic work from a public office, official architecture having generally a mediocre reputation for beauty, whatever other advantages it may possess. In the case of Boston, the accounts show that the city architect's work, since Mr. Wheelwright's incumbency, has been done at a very moderate cost, and the municipality may congratulate itself on having been so well served. We ought also to mention, as a member of Mr. Wheelwright's office who has done not a little to reflect credit on the official architecture of Boston, Mr. Maginnis, the draughtsman to whom the preparation of the perspective sketches which illustrate the book has been entrusted, and who has carried out his task with great skill and artistic feeling.

THE *Builder* has an editorial on the subject of modern architectural sketching which is interesting, if not altogether judicious. Premising, what is true enough, that it is the business of art to represent, as well as is possible with our inadequate materials, things as they are, without intentional perversion of any kind, the *Builder* thinks it necessary to protest against the ridiculous falsifications with which many architectural draughtsmen load their representations of buildings, for the sake, as they say, of picturesqueness. It cites the case of a drawing of the interior of a French cathedral, built at the end of the thirteenth century, and still in the perfect condition in which it was left by the unrivalled skill of the masons and stone-cutters of that period, every tile in the pavement being level and unbroken, the moulded ribs of the roof intact, and the surfaces of the vaulting smooth and regular. The draughtsman, in his representation of this smooth and accurate piece of workmanship, had seen fit to show the vaulting ribs so splintered and broken that the mouldings were indistinguishable, while the vaulting itself was represented as being of clumsy brickwork, in place of the smooth and skilful stonework of the thirteenth-century masons. The columns and piers, still perfect, even to the carving of their capitals, were shown splintered and disjointed, and a labyrinth of pitfalls occupied the place of the smooth pavement. This "absurd and false" mannerism usually pretends to be the result, and the evidence, of an intensely artistic feeling on the part of the draughtsman, who, we are told, being unable to endure anything which is not picturesque, unconsciously imparts picturesqueness to his rendering of what does not really possess that quality, and the *Builder* is quite right in thinking that it is quite time to protest against this notion. For our own part, we are convinced that the practice of deliberately falsifying beautiful pieces of architecture, for the sake of introducing clever touches of rendering, is the surest means of destroying the perception of proportion, contrast and modelling upon which the art of architecture depends. A comparison of a representation, by one of the modern "effective" draughtsmen, of, let us say, a Gothic church, with a photograph of the same church, will show, better than anything else, how utterly indifferent these men are, not only to the proportions of their model, but to the spacing of windows, arrangement of buttresses, curvature of arches, and everything else that makes the building really an architectural object, and it is notorious that the people who win fame in their younger days as masters of picturesque "fudging" rarely produce actual buildings, in their later career, of more than mediocre merit.

WE shall at once be reminded of Mr. Norman Shaw, who is certainly an architect of consummate talent, but who is apt, in his perspective sketches of his own buildings, to give them an air of picturesque unevenness which they do not possess when they come to be executed. Here, however, an important distinction should be noted. There is nothing wrong, or incompatible with architectural feeling, in a loss of picturesqueness, but the contrary, and it is only the attempt at deception which does the injury to those who pretend to find it where it does not exist. With Mr. Norman Shaw, as with many other architects who delight in picturesqueness, the first conception of a building presents itself with the delicately curved outlines and broken colors, which charm them in the ancient architecture of England and France. It is natural that they should make their first sketch in conformity with their conception, and the difference in effect between the straight, angular outlines of their executed building, and the picturesque curves of their sketch, which is

very noticeable in Mr. Shaw's work, is due rather to the intractable nature of the materials which they are forced to employ than to any intention on their part to deceive. Every one who has designed a building knows that the first free-hand sketch is usually much more satisfactory to the artistic sense than the later drawings, and that the labor of designing consists principally in the effort to give to the actual geometrical forms the charm which it is so easy to obtain in the sketch. There is no attempt at deception in this effort, which is simply a part of the eternal struggle of the artist to reconcile the useful with the beautiful, the material with the spiritual, and it is only the unfeeling and dishonest men who use such sense of the picturesque as they possess only to impose upon themselves and the public.

THE *Scientific American* has taken up a subject which is by no means new, in the shape of the decoration of plumbing pipes. It says, with perfect reason, that the casing in which such pipes are boxed up, to conceal them, form not only nests and passage-ways for vermin, but conduits for the conduction of odors from the kitchen and cellar to every part of a modern house. In apartment-houses, particularly, it says that the distribution of household perfumes goes on so rapidly and thoroughly that the older houses of the kind are almost unrentable, on account of the odor with which they are impregnated, and bring in hardly one-third the income that they produced when they were new. As a remedy for these evils, the *Scientific American* advocates Colonel Waring's plan of carrying the pipes exposed on the walls of the rooms, and decorating them so as to form ornamental objects. As an example, it mentions that a "dark bluish-gray" soil-pipe, with silver-bronzed hubs, presents a beautiful appearance, and that lead pipes may be "polished and varnished" with good effect.

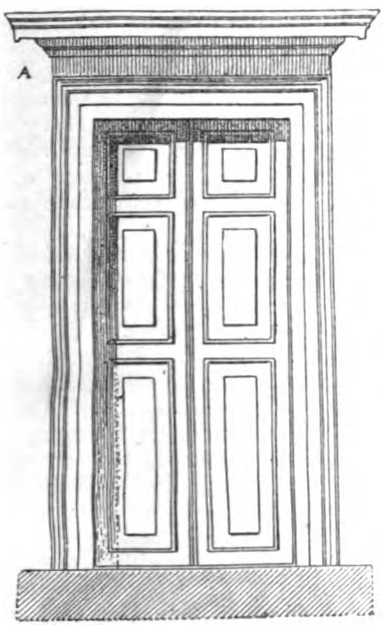
WHILE fully agreeing with Colonel Waring and the *Scientific American* as to the importance of doing away with the nurseries of filth and vermin known as pipe-casings, we cannot say that we have ever seen a decorated soil-pipe which seemed to us an attractive feature in a room, and the problem of combining the useful with the beautiful in this, as in many other matters of building, has yet to be satisfactorily solved. It is, however, necessary to solve it soon, for hollow floors and walls furred with wood are beginning to disappear from our most costly buildings, and in such buildings the pipes must be exposed. The old practice of running the soil-pipes in a chase in the masonry, and then filling around them with brickwork, had the advantage of doing away with casings and air-channels, but there is some danger that a lead joint may start after it is buried in the masonry, and the law now usually forbids filling around pipes. The only alternative is, therefore, unless they can be covered with removable casings, to have them exposed. If left to themselves, architects could usually plan the bath-rooms so that the pipes from them would run down in closets or pantries, where they would be unobjectionable; but it often proves to be indispensable to the owner's comfort to have a bath-room or a wash-basin over a parlor or a dining-room, where concealment of the waste-pipes is impracticable. Under such circumstances the pipes must be decorated, but it does not follow that they must be painted blue, with silver hubs. On the contrary, a much better effect is produced by bronzing the pipe all over, and wrought-iron tubes, on the Durham system, lend themselves far more easily to such treatment than the cast-iron pipes, in five-foot lengths, with huge hubs, and "Mott's X heavy" in conspicuous characters on each length. For buildings of the first class, a thin cover of polished brass, or aluminium bronze, might be slipped over the iron. If cast-iron pipe must be used, it does not seem impossible that a joint might be devised not only more secure, but more ornamental, than the huge hub and spigot, and young architects might do worse than devote some of their ingenuity to the subject. For the supply-pipes, again, some new material is desirable. The nickel-plated brass commonly used for "open" plumbing soon tarnishes, and then looks worse than the unpretending lead. If the untarnished aluminium bronze could be obtained in the form of pipes and traps, it would be an excellent material, and, in default of this, a very beautiful and unchanging steel-blue color may be produced on brass pipes by the use of antimony, as we think, which would have an excellent effect. Aluminium itself is, as yet, far too costly here for such use, but we may hope before long to see its price reduced sufficiently to make it possible to use it for the best class of plumbing.

M. DELAHAYE, in the *Revue Industrielle*, gives a novel explanation of trades-unionism. Speaking of the ridiculous strike on the English Northeastern Railway, ordered to prevent the company from testing the eyes of the engineers and brakemen, to see whether they were able to distinguish a red light from a green one, he says that agitators care nothing whether collisions occur from the color-blindness of the switchmen or not, so long as they can find any sort of pretext for asserting their influence. This passion for "bossing" other people he thinks is not a peculiarity of walking-delegates exclusively, but belongs to nearly all workmen. He says that he knows from experience that if two workmen are set at work side by side, one of them will always take upon himself to give directions to the other. This "mania for bossing," (*manie de commandement*) he finds greatly developed among multitudes of "good souls," (*braves gens*) hardly capable of directing their own little affairs, much less those of other people; and he thinks that the agitators and mischief-makers play upon this weakness of the workingman's nature to delude him into the "struggles" with capital out of which they get such a comfortable living.

IT has been whispered of late that the new American system of executing criminals by electricity was not so effective and certain as had been supposed, and it has even been asserted that the real execution is performed by the scalpels of the Doctors in their so-called autopsy on the unconscious victim. The authority for these criticisms seems to be M. d'Arsonval, a distinguished French physicist and electrician, who has recently, in connection with M. Biraud, carried out a series of experiments on the physiological effects of electricity, at the laboratory of M. Lacassagne, at Lyons. The primary object of the experiments was to ascertain what remedial treatment, if any, could be applied to cases of severe injury by electric shocks to the workmen employed in electric-light stations. M. d'Arsonval divides injuries due to electric currents into two classes. The first class comprises those where the tissues are torn and burned by the mechanical effect of a very violent momentary discharge, such as lightning, or the "disruptive discharge" of a battery of Leyden jars, or a large condenser. The second class includes the effects of the suspension of vital functions which follows the shock to the nerves caused by the passage through the body of a continuing current; and this class includes all the cases met with in ordinary electrical work. Although the action of the heart and lungs is often arrested by the passage of strong currents, so as to cause apparent death, M. d'Arsonval finds that the check is often only temporary, and that the patient may be revived by the same means used for the resuscitation of persons apparently drowned, including particularly artificial respiration. Of course, the laboratory experiments on the subject was made upon animals, but the treatment suggested by trials with them has been applied in several cases of apparently fatal injury to men from electric currents, with a successful result. It was in the course of his experience in resuscitating small animals that M. d'Arsonval was led to doubt the efficacy of American "Electrocutions." He found that with a Ferranti machine, giving a current of twenty ampères, at twenty-five hundred volts pressure, a rabbit could not be killed with certainty, artificial respiration often reviving one apparently dead from the effect of the current; and even the current from a Gramme machine, giving eight thousand volts pressure, did not always produce death in a rabbit. As the machines used for "Electrocution" in America are less powerful than the Ferranti dynamo, which could not be depended upon to kill a rabbit, and give a pressure of only fifteen hundred volts, in place of twenty-five hundred, he concluded, with some show of reason, that they must, in some cases, at least, merely produce insensibility, the patient being finished by the "post mortem" examination which appears to be the usual sequel to the execution. In order to test the truth of his surmise in regard to what he calls the "complicated, barbarous and unreliable" American process of execution, M. d'Arsonval is said to have challenged the American prison physicians to practise artificial respiration on a criminal fresh from the "death-chair," but the challenge has not yet been taken up.

DOORWAYS.[1] — I.

TWO posts or limbs of a tree fixed vertically in the ground, connected at the top by a horizontal stick of timber, or two piers in masonry-work, joined at the top by a long stone, constitute all that can be conjectured of the "prehistoric" origin of the modern form of entrances to human habitations. [See "*Maison*"]. An attempt to find the dispositions best suited to assure stability to the framings, as well as the necessity of diminishing the thrust of the cross-piece, or lintel, would naturally result in a slanting of the vertical supports — posts or piedroits — and a trapezoidal form of this primitive bay.



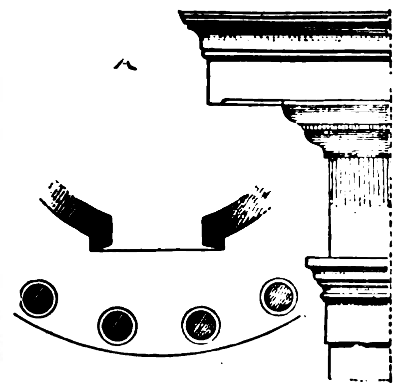


Fig. 1. From the Temple of Vesta, Tivoli.

As for Egyptian antiquity [See this word], it would seem that at least the temple doorways, which are rectangular openings formed by two piedroits and a monolithic lintel, were derived from that early tradition of a transverse beam supported by two posts; while the arch [See "*Construction*,"] was also employed by the Egyptians, but in other positions and at a later date. The Egyptian doorway, which was often made in a sloping wall, had a rectangular head and perpendicular piedroits. Then came the demand for decoration, which has in all ages and everywhere, perhaps, led architects to carry up the frames of important doors by means of a crowning plainly designed to give the motive more or less of grandeur and nobility. The great Egyptian gorge crowns the enceinte gate, or pylon, as imposingly as it is used in the temple itself, with its columnar disposition. The Egyptian pylon is an edifice by itself.

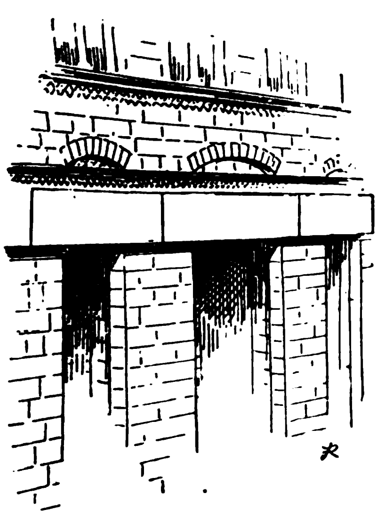


Fig. 3. From a Romanesque House at Saint-Gilles-du-Gard.

The Greek and Roman temple doorways are simply openings left in the rear wall of the portico, which in its architecture belongs to some one of the classic orders, and on which Vitruvius makes the proportions and certain details of the entrance depend. The Greek doorway sometimes has its lintel at the height of the architrave of the order [See "*Architecture Grecque*"]; it is then, as it were, merely a break in the wall of the cella, a narrow opening in the stone curtain that partially envelops the image of the divinity in mystery. When in the Erechtheum [See "*Architecture Grecque*,"] the door is of more human proportions, it is encircled by a rich ornamentation overrunning the mouldings of the casing, which is crowned by a cymatium equally ornate and accompanied by consoles. Do not the cymatium, on the one hand, and on the other the roses adorning the dressing, point unmistakably to an early imitation, evidently of Egyptian art in the crowning, and of Assyrian in the ornamental flora?

Vitruvius, in fixing the form and disposition of doors, doubtless includes only those of the temples. He determines three kinds: Doric, Ionic and *Atticurges*. Commentators consider the last synonymous with Corinthian. The differences existing in these various types, which are all rectangular with a lintel, are confined to a few variations in measurements and detail, which it would be useless to go over here, especially since they depend mainly on the relations of the doors to the order of the peristyle. A noteworthy observation, however, is that bearing upon the *Atticurges* door the *jambs of which are slightly inclined.* Examples of doors narrowed at the top are not wanting in antiquity. Under the word "*Augusteum*" a remarkable example has been given. Serlio (lib. IV, cap. VIII) and, later, Desgodets, have held up to us as a model of the kind, the doorway of the Temple of Vesta, at Tivoli (Fig. 1), conforming as it does in this respect to the teachings of Vitruvius (lib. IV, cap. VII). The height of the bay is between $2\frac{1}{4}$ and $2\frac{1}{8}$ times its width, or about $2\frac{2}{7}$. The height of the entablature is nearly $\frac{2}{9}$ that of the bay. And the top of the latter is even with the top of the capitals of the peristyle, which is in the Corinthian order. The casing is continuous around the bay, without ears or crossets.

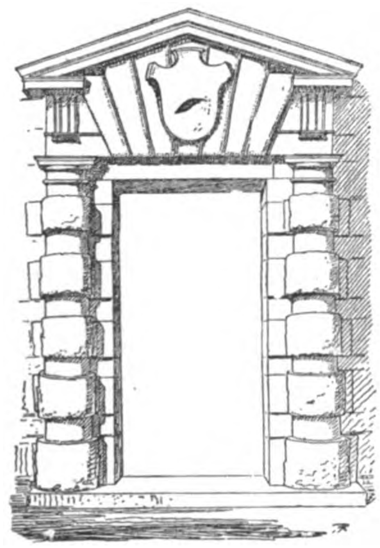


Fig. 2. Rustic Doorway designed by Serlio.

Serlio speaks a little farther on of an antique Corinthian door then existing at Palestrina (the Præneste of ancient times), of which he gives a reproduction. The height of the bay was, he said, twice its breadth; the width of the piedroits of the casing $\frac{1}{6}$ that of the bay; a quite prominent entablature, with rectangular pediment, rested on two ornamental consoles, with volutes, which extended down at the sides of the piedroits of the casing below the crossets. Crossets also projected at the bottom of the piedroits. The author classes this work in the Corinthian order.

A third antique door, quite different from the first two, and which has been copied in Italy and France at different times during the sixteenth and seventeenth centuries, is that which Serlio says he saw near Foligno, in Umbria. It is an arch constructed of long keys and inserted between two parts of a cornice, which is cut and surmounted by an angular pediment. Two Corinthian columns form, with the pediment which is thus cut at the bottom and which they support, the sole frame of the door.

Fig. 4. From the Greco-Roman Ruins of Kefr-Birim (Galilee.)

It is doubtless after this bit, so unlike the familiar forms of ancient architectural remains, that Serlio composed the type of rustic doors shown in Figure 2, in which there is an apparent effort to relieve the upper part of the door of the horizontal straight lines that recall the severe lintel of the doors of temples with a portico. There is no question here of a peristyle; the rustic door of Serlio, like the ancient door of Foligno, is independent of any shelter and can, with its embellishments and decorative importance, be carried up to any height consistent with good taste and propriety. Examples of similar architectonic license are encountered in Roman edifices

[1] From the French of E. Rivoalen, in Planat's *Encyclopédie de l'Architecture et de la Construction.*

of the time of the emperors [See "*Construction*," pl. LXXXII, Circular Temple of Baalbek]; and the artists of this so-called period of decadence seem, as it were, the precursors of the future Renaissance and even of the so-styled eccentricities of the seventeenth century. The niches of Baalbek, for example, and their circular pediments appear to be the ancestors of the Louis XIII and even the Louis XV niches, and of the pediments of old Paris [See "*Niche*"]. The same may also be said of the Romanesque discharging-arch (Fig. 3), which became the arch of the Gothic tympanum in mediæval doors; its origin can be clearly traced in certain Greco-Roman edifices, such as the temple of Kefr-Birim in Galilee (Fig. 4). The discharging-arch is here constructed above the lintel, which is laid as a platband, and forms a sort of blind impost above the entablature cornice for the convex frieze surmounting a projecting dressing with crossets.

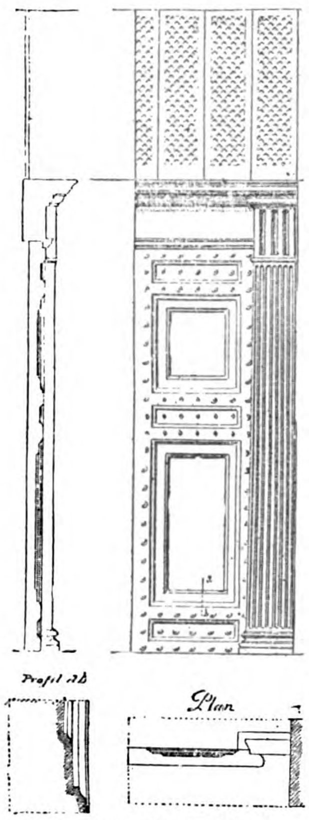


Fig. 5. From the Pantheon, at Rome.

Among the examples of Romanesque church-doors still to be seen in France and especially in the south, we need only to recall "the side-door of the old Church of Alet (Aude), to-day in a great part destroyed . . . ."[1] and which "seems to have been copied from a Romanesque-Greek structure of northern Syria,"[2] for the arch of discharge forms the archivolt—with mouldings in the ancient style—of a blind impost, and the lintel is like a part of an architrave—likewise moulded—placed on two very flat corbels which are quite finely profiled. In Italy [See "Italian Architecture," Fig. 7, *American Architect* for November 21, 1891] it is still easier to detect bonds of relationship between the art of the Middle Ages and of the later periods of antiquity.

In the thirteenth century, the discharging-arch stilted into an ogive, is found framing a tympanum with a surface sufficiently developed to admit easily of an iconographic decoration. Without going out of the limits of this article, or using again what has already been given under the heading "*Portail*," we would call attention to the tympanum of a door in the Castle of Coucy, a sketch of which has been preserved for us by Du Cerceau ["*Les plus excell. bast. de France*"]; this bit of Gothic architecture may complete our evidence of this traditional origin. However, it is only a matter of detail, which may be classed under the general archæological fact worked out recently by one of the most competent critics of monumental history,[3] namely, that mediæval art is connected by a succession of more or less interrupted transitions with that of antiquity.

The most remarkable ancient doorways still in existence are entrances to temples. One of the best preserved is that of the temple at Nîmes, known as the *Maison Carrée*. Its lintel forms a rectangular bay, the height of which is a little more than twice its width. The door of the Pantheon, the most perfect specimen known, is in the same proportions, and its so-called bronze divisions (Fig. 5) are formed, as was ordinarily the case, of a wooden frame revetted with metal plates. The use of ornamented nails, which have become a mere decorative feature in imitations of this celebrated model, then grew out of the necessity of fastening the metal plates by means of bolts or rivets to the wooden framework. This framework, as was later true of the robust doors of the Middle Ages, was put together in a way to resist the heavy weight by discharges constituting indeformable triangles. In giving modern wooden panels the shapes affected by the enveloping panels of laminate metal, architects have succeeded in subordinating the stability and resistance of the work, to an ill-understood traditional form. However, Serlio (Book IV, Chap. X) recalls, in speaking of modern doors of large dimensions, the advantage which the ancients possessed in the use of the pivot *à tourillons* instead of the modern hinges and ironwork which are often unequal to sustain the movement of such heavy weights. At the same time, he indicated by designs the structure of the *frames*, or wooden stays, which were left exposed with a wood filling, or were revetted with metal. And this sort of lattice-work, with the cross-bars rabbeted together, would surely prevent the sinking of timbers and the disjointing of the scarfing, a difficulty which, in modern doors, whether heavy or light, leads so quickly to deformity [See "*Menuiserie*"] because they are not constructed according to these wise directions, or after the rational method adopted by the carpenters and *huchiers* of the Middle Ages.

[1] Lebon, "*Les premières Civilisations*," p. 681.
[2] Viollet-le-Duc, "*Dict. rais. de l'Arch. fr.* "Porte," p. 440, Fig. 75, A.
[3] M. Corroyer, "*L'Architecture romane*."—"*L'Architecture gothique*."

The interior wooden door of the Château de Blois (period of Francis I) a sketch of which is given in Figure 6, seems to indicate that architects were then sometimes anxious to harmonize solidity of structure with decorative forms.

For the casting of the bronze doors of Saint Paul at Rome, about the middle of the fifteenth century, the Roman consul, Pantaleon, was obliged to go to Constantinople, which was then the refuge of the industrial and artistic traditions of antiquity. An inscription gives the name of the maker as Staurachios Tuchitos, from the island of Chio. The foundation of the doors, which are five metres high and together about 3m. 35 in width, is of wood cased with metal. We can count more than fifty compartments or panels in them, containing isolated figures of the apostles, evangelists and prophets, and sculptures depicting divers circumstances in the life of Christ, the Virgin and the early martyrs. The bronze was covered with niello and silver lines which have now disappeared, at least partially.

It was also at Constantinople that the bronze doors of San Marco, at Venice, were cast toward the middle of the thirteenth century. And yet about 1180, Bonano of Pisa cast some for the cathedral of his native town. Similar ones were also made at the same time for the cathedral of Novogorod, bearing inscriptions in Russian characters.

In the fourteenth century (1330) Andrea Ugolino executed the bronze doors on the right of the baptistery of Florence, after designs by Giotto, it is said. But the most famous doors of this monument, and the most beautiful known, are by Lorenzo Ghiberti, the successful competitor in a contest with Brunelleschi and Donatello, who themselves, we are told, acknowledged him as the winner.

Fig. 6. Francis I Door, at Blois.

The bronze doors of the old basilica of Saint Peter were executed in 1445, and afterward placed at the principal entrance to the new church. Antonio Filarete, a skilful architect, and Simone, brother of the celebrated Donatello, were the authors of the work.

There are also some very remarkable bronze doors at Padua (Church of San Antonio), at Verona (Basilica of San Zeno), at Bologna, Lucca, Loretto, Ancona, Benevento, Naples, Amalfi, Monreale, etc., in Italy; at Hildesheim, Mayence and Augsburg, in Germany; at Moscow and Alexandrowna Slobada, in Russia, and in the mosque of Cordova in Spain, where only five of the twenty bronze doors formerly existing now remain. Lastly, France possesses, or, at least, did possess down to the time of the Revolution, in the Church of Saint-Denis, a metal door at the main entrance to the church, and,

in the crypt, a bronze door closing the sepulchral vault of the kings; and at Strasburg, a bronze door, with bas-reliefs, executed for the cathedral about the middle of the fourteenth century. Then there are the quite modern doors of the Panthéon, by Constant-Dufeux; those of the library of Sainte-Geneviève, by Labrouste; those in the Madeleine and at Saint-Augustin; and, lastly, the doors of the Prefecture of Police and of the Court of Cassation. The framework of these last is of iron.

[To be continued.]

CONSTRUCTION.[1] — XXII.

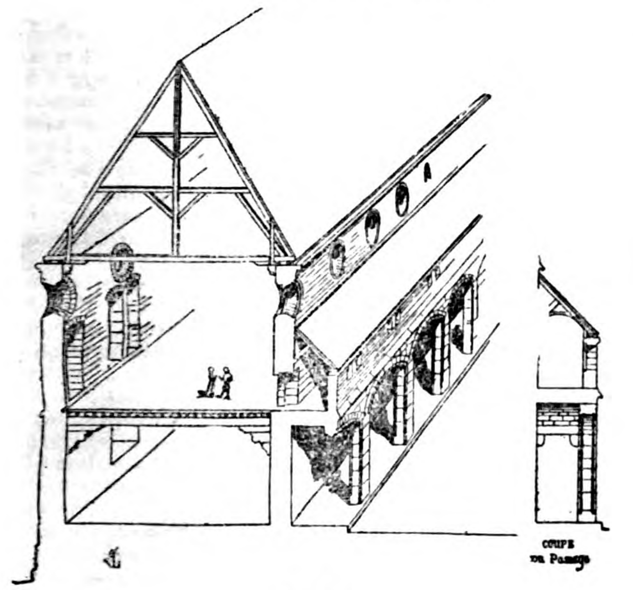


Fig. 119.

CERTAIN special arrangements were also imposed upon the architects of the great dwelling-houses by very sensible customs. It was not permissible during the Middle Ages, any more than during antiquity, to give a large hall and a small chamber the same height between joists; to make a passage-way as lofty as the apartments to which it gave access. Centuries of false reasoning in architecture have been necessary to bring about the neglect of such true principles and to oblige us to live in large low-studded rooms if the story we occupy is low-studded, or in little unreasonably high chambers if we have a story fifteen or twenty feet in the clear. In large cities the height of the stories being governed by regulations, one can understand how necessity has imposed conditions as inconvenient as they are ridiculous. But wherever an architect has free play, in a country-house or in a mansion, it is very unreasonable for him to neglect to pay attention to the superficial dimensions of apartments so as to fix the height suitable to each of them; to light small chambers or passage-ways by windows having the same dimensions as those used for large apartments; to make lateral corridors obstruct all the light from one of the faces of the building; staircases cut across the middle of window openings; mezzanine stories at the expense of large windows, so that a given architectural style, which matters very little to the inhabitants of a palace, may not be interfered with; or, still more, to place corridors along the middle of houses giving access to the apartments to the right and left, corridors lighted by makeshift windows, badly ventilated, gloomy, draughty as an inn-hallway, taking up valuable space and bringing a weight on the floor-beams in their weakest part. The mediæval architects did none of these things and did not even imagine that they could be done and they are certainly not the ones to be censured for so thinking. Their dwelling-houses were almost always one room in depth. And in order that the apartments into which they were divided transversely should not open into one another, which would have been very inconvenient in most cases, they arranged lengthwise of these buildings low, covered galleries, which gave access to each of these apartments while still permitting windows to be placed above them (Fig. 119).

If the building had several stories this arrangement could still be preserved with all its advantages (Fig. 120).

At *A* is seen the first story with its gallery, *C*, above which are the windows lighting the rooms; at *B*, the upper story, almost always open timbered, lighted by windows surmounted by dormers, *E*, on the side opposite to the gallery and by dormers only above this gallery. The passage for the upper story is carried on arches, which permit of window-openings between their vertical faces, lighting directly the first story. Such an arrangement still exists at the Palais de Justice at Paris, in the western portion; it dates from the thirteenth century. We cannot decry the reasonableness and truth shown in such construction, which gives to each household department its relative importance, which supplies to the principal apartments all the air and light they demand and which evidences very clearly by the exterior, the interior uses and arrangements of the structure. It is certainly more in accordance with the good old traditions of antiquity than is a row of columns or pilasters planted, one knows not why, against a wall. It shows that while the mediæval ecclesiastical architecture departed from the ancient models, nevertheless civil architecture was able for a long time to preserve their spirit. We shall note more than one proof of this. When the dwellings are large and the buildings are composed of several stories, a thing which the mediæval architects frequently did, for the simple reason that two stories, one above the other, cost less to build than if one undertakes to cover a superficies equal to that of the two stories on the ground-floor, since it is then necessary to double the foundation and the roof — when, we say, the structures contain several stories, the architect increases the number of stairways so that each apartment has its own. Nevertheless there is always a principal flight, a staircase of honor which leads to the apartments intended for receptions. During the Romanesque period, stairs of cut stone are not common; they were usually made of timber, that is to say by superposing squared logs, whose ends are slightly let into the lateral walls; later staircases were made of two straight flights with landings and were included in a rectangular cage, longitudinally traversed by a bearing-wall [See "*Escalier*"]. This method was almost entirely abandoned by the constructors of the thirteenth century, who adopted spiral staircases with stone newels and treads because they occupied less room and gave easier access to the stories which were to be reached. If these spiral staircases had a very small diameter, say five feet in the clear, they were frequently built in the thickness of the walls, forming a slight projection on the outside rather than on the inside; if, on the contrary, they occupied a cylindrical or polygonal cage of considerable diameter in the clear, say eight or ten feet, they projected entirely on the exterior and did not interfere with the external arrangements. As for the attached buildings each possessed its own roof and if the structures were of double extent, there was a roof over each portion

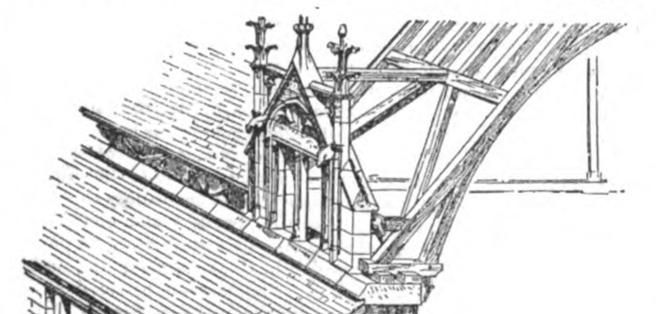


Fig. 120.

with an intermediate gutter. The mediæval architects having felt compelled to adopt roofs whose slope was more than 45° and having no conception of gambrel roofs could not understand a structure of double extent under one single roof, for this roof would then have

[1] From the "*Dictionnaire raisonné de l'Architecture Française,*" by M. Viollet-le-Duc, Government Architect, Inspector-General of Diocesan Edifices, translated by George Martin Huss, Architect. Continued from No. 900, page 182.

reached an enormous dimension as far as the height is concerned. It was easy to place, if need be, roofs at different levels on every detached building, every pavilion, every staircase, possessing its own roof, whether pyramidal, lean-to, gabled or hipped and thus to obtain stories high between joists when they were large, or low when they were small. This method used a great deal of wood and roof-surface and required lead-lined gutters, but it had this advantage over that which consists in enveloping all the parts of a building under one

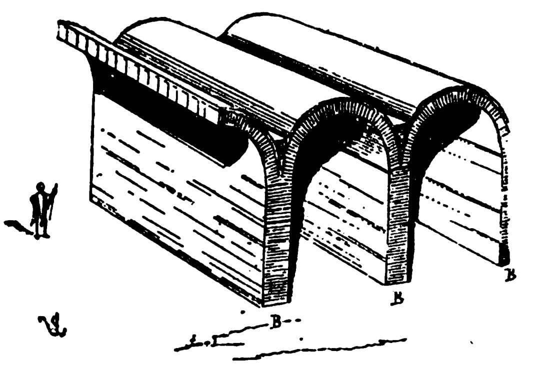


Fig. 121.

roof, viz, that it furnished to architects various resources in respect to giving height to stories, of permitting them to open a large number of dormers, to illuminate the upper stories, of detaching the staircase roof from the main roof, thus providing lookouts above the eaves and acting as ventilators for the lower stories. Seen from a distance these distinct roofs covering groups of connected buildings, indicating their form and their purpose, were very picturesque and gave to large dwellings the appearance of a collection of houses of greater or less extent and height according to their various uses.

It is easy to be seen that this construction differed at all points from that of our own times and it should be remarked that these traditions preserved their force until toward the middle of the seventeenth century. In principle if not in form we note in these arrangements the trace of the great dwellings of antiquity, the *villæ*, which were in truth nothing but groups of buildings more or less connected, but distinct in form, in height and in covering. Careless of the laws of symmetry the mediæval architects placed the different departments of the large dwellings anywhere according to orientation, with due regard to the needs of the dwellers and conformably to the configuration of the ground. This furnishes another point of resemblance to the antique *villæ* which in their *ensemble* had nothing symmetrical. In the cities which were almost all fortified at that time, ground was as rare as it was in the fortified towns. In the châteaux whose perimeter was always limited as much by motives of economy as by the necessity of defending it by a small garrison, every foot of space was utilized. Consequently the architects had to endeavor in town as well as in the country to accommodate as many household needs as possible in a relatively small space. In this regard the mediæval civil constructions differ from those of the ancients; the latter in their *villæ* scarcely built higher than one story and occupied considerable ground. Obliged to confine themselves within restricted limits, the architects of the Middle Ages were compelled to adopt interior arrangements differing likewise from those employed by the Romans; to accommodate various kinds of work on different stories; to make passage-ways in the thickness of the walls; in short to seek entirely new combinations of structures. We do not forget, however, this important point, that one reason why the ancient traditions perpetuate themselves in civil constructions is the very natural one that everything concerning everyday life transmits itself from generation to generation without possibility of interruption, that domestic habits cannot be abruptly changed and that it is possible to make a radical revolution in the system of construction of public monuments, like churches, while this is impossible for the dwellings or palaces which people live in and in which everybody follows the same way of living which his father followed. The method of construction applied at the end of the twelfth century to religious edifices has only a feeble influence on civil edifices.

The pointed arch had scarcely appeared in these last edifices bringing its wide-reaching train of consequences as we have shown.

Civil and military construction preserved something of Roman art even when the last traces of this art had long since been abandoned in religious architecture. There were then two quite distinct modes of building dating from the end of the twelfth century: the religious and the civil; and this state of things lasted until toward the middle of the sixteenth century. The monasteries even use both of these methods together; their domiciles have no relation, so far as construction goes, with their churches or their chapels. Nevertheless, one of the principal attributes of construction at the moment when it abandons Roman traditions, daring, is found also in civil as well as in ecclesiastical architecture; but, it is evident in civil architecture, that the positive ideas, the daily needs, the inherited habits have a more direct influence on the methods adopted by the builder. Thus, for example, rock-faced rubble is used in civil architecture for a long time after all religious constructions were made of cut stone; horizontal arches of stone were everywhere applied to dwellings in the twelfth, thirteenth, fourteenth and fifteenth centuries, at a time when no trace of them was longer to be found in churches.

Buttresses are avoided as much as possible on the exterior of palaces and mansions, even where there exist vaulted stories, while they constitute the entire system of ecclesiastical construction. The civil architects still continued to employ wood, whereas this is used only for the roofs of cathedrals and other important religious edifices. Seeking to avoid plane surfaces, to diminish points of support, they at last reached the point of totally suppressing walls in rearing their grand religious edifices; on the other hand in civil architecture they augmented the thickness of the walls in proportion as prosperous conditions obtained, which created a demand for more comfortable, stronger and healthier houses. The study of these two sorts of buildings should then be followed up separately and if we find inevitable points of similarity between these two systems, it will be less in the methods used than in the frank and daring charm, the infinite resources, which belong to the lay architects of mediæval times.

All who have any notion of architecture know that the Romans, while indeed they constructed vaulted edifices, maintained the thrust of the vaults rather by interior buttresses than by piers forming an external projection. They had adopted, especially in building civil structures, the method which we shall call cellular; that is to say they made their buildings of a series of rooms with barrel-vaults on bearing-walls which reciprocally buttressed each other and thus caused no thrust on the exterior. From this principle sufficiently demonstrated by Figure 121 result the consequences which might naturally be expected. If, for example, it was desired to make a single room out of all these clustered cells, it was only necessary to throw a longitudinal barrel-vault across all these transverse barrel-vaults; there resulted a succession of groins, Figure 122, well buttressed by interior counterforts, letter A the remains of the bearing walls B shown in perspective in the sketch, Figure 121. This arrangement permitted building at C either solid walls or spaces as light as possible as there was no weight on them. This was both a simple and durable construction, easy to build and which answered for a long time as the type of civil edifices in the Carlovingian epoch.

In order to avoid expense and if vaults were not preferred, during the Roman period they contented themselves with laying floors on top of two parallel ranges of semicircular arches. In this way several stories could be built one above the other without fear of having the lateral walls spread, since they were composed of buttresses furnishing a succession of interior piers and united together by arches which intersected; underneath these arches as many openings were made as necessity demanded for furnishing air and light to the rooms. Figures 115, 116, 117, 118 which show us one of the houses built in the thirteenth century, in the town of Cluny, still preserve the remnants of this Roman tradition, as the front of this house really consists of nothing else but a series of bearing arches masked behind the exterior facing. If this combination lent itself to the most prosaic civil constructions, it was equally suitable for military purposes as we shall very soon see; it was still later applied to the construction of the great halls of the châteaux and Episcopal residences, since the hall of Henri II at Fontainebleau shows us one of the latest examples of it, seen likewise in a thirteenth-century room in the close of the castle of Montargis and also still to be seen in an ancient diocesan hall of the twelfth century at Angiers near the cathedral, both of these latter being built according to this principle [See "*Salle*"].

A very important thing to notice in the mediæval civil constructions is the attention which the builders paid to the smallest details

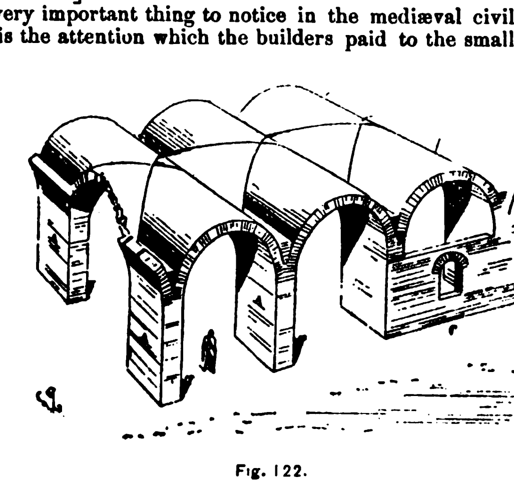


Fig. 122.

of the structure. If they are about to make a floor, well squared holes are left for the girders in the interior faces of the walls instead of cutting them out afterwards; they build-in stone corbels under the bearing ends of these girders; they make horizontal rebates lengthwise of the bearing walls to receive the headers with which the tail-beams are framed or else open bearings at regularly spaced intervals. In the embrasures of the windows they built in the hinges, they made rebates in the interior of the mullions to receive

the staples of the bolts or locks. Their chimneys built at the same time as the walls have the flues dressed on the inside with the greatest care; the jambs of the fireplaces are bonded into the walls and not simply built up against them; the passage of the flues through the flooring and the supports of the upper hearths indicate great carefulness and a plan well thought out before the work was begun. All these things would teach us an excellent lesson to-day, if we were willing to consider and rid ourselves of this mania of believing that we can obtain no good from the past when that past is a cis-alpine one.

In the large civil structures, such as the assembly-rooms or "Halles," the mediæval builders are almost always careful to introduce lower and upper windows, the low ones enable one to see what transpires outside and admit air; the upper ones admit light directly from above. These upper windows are made in the slope of the roof and form dormers on its exterior. Whatever the superficial extent or height of the room, the windows were always kept of a size convenient for use by men and women and, what is still more important, of a reasonable size for sashes intended to be frequently opened. So far as the dormer sashes are concerned they were opened like a lid of a box by means of cords and pulleys [See "*Lucarne*"].[1]

One is too easily tempted to believe that however ingenious the mediæval architects may have been they could not form those large conceptions of *ensemble*, those vast buildings of a civil character demanded by our modern necessities which assume every day more and more importance: but this is another prejudice. It must be said that most of our great churches still standing to-day make us see plainly that in ecclesiastical architecture the constructors knew how to begin and carry through very vast monuments; but as for the civil structures of the Middle Age, cruelly treated during the last few centuries, condemned to systematic destruction since the Revolution, scorned by our French administrations of Public Works, who recall on a small scale the weakness of Louis XIV and seem to wish that everything in their town shall bear trace of their passage — our civil structures of an ancient date, we repeat, have become very rare and it is not surprising that the people have lost even the memory of them. Nevertheless it would have been very strange if men capable of conceiving and executing such immense religious edifices had contented themselves, for the ordinary needs of life, with small buildings covering but little ground, low, narrow species of cabins, of miserable appearance. There are certain persons who would wish to make us believe, as a consequence of a spirit of system which it is not now our place to criticise, because it is completely a stranger to artistic ideas, that mediæval society was shut up between the church and the fortress; that it was in consequence, unfitted to conceive and execute these immense structures of public utility demanded by our modern customs; in short that it lived a miserable life, suffocated under a twofold oppression, frequently antagonistic, but always united for the purpose of arresting its development. From the standpoint of politics the fact may be discussed, that is not in our line; but from the standpoint of art there can be no discussion. The artists who drew the plans of our cathedrals were not at all embarrassed when it came to constructing those immense civil establishments, such as hospitals, colleges, town-halls, markets, farm-houses amply provided with all appurtenances.

[To be continued.]

OLD VIRGINIA TAVERNS. — Here in Virginia we have had some famous hostelries. The old Raleigh Tavern at Williamsburg lives in romance and history. It must have been well kept, for contemporaneous writers speak of it so very respectfully. They could not have written of it as they did had the proprietor furnished them with tough beefsteak or bad bread, or sent them to shabby chambers, or hired a man with a Kohinoor in his frilled shirt bosom to give them short answers to civil questions. Tavern was once the great name here. The Bell Tavern, which preceded the present St. Charles, was a famous place of resort when Byrd's tobacco-warehouse stood on the opposite side of Main Street, and it had a worthy contemporary in the Washington Tavern, which is now the St. Clair. The Eagle Tavern was of later date and was a grander house than the other two. In it Lafayette was entertained in 1824. The Eagle stood on the south side of Main Street, between Twelfth and Thirteenth, and had an archway — the *porte cochère* of the present day — into which the stage-coaches drove and landed their passengers. Fire destroyed it early in the forties, and from the city's need for another good hotel the Exchange arose. The Exchange, the Ballard House, the Columbian Hotel, the Powhatan (Ford's) Hotel, the Monumental (St. Claire), and the St. Charles and the Spotswood were all in operation here at one time. — *Richmond Dispatch.*

[1] These dormers faced with stone were used in building from the thirteenth century onward and, nevertheless, in the time of Louis XIV, it was pretended that this method of making windows at the eaves of a roof was invented by Mansard; and in order to perpetuate the remembrance of this useful invention the term of "mansards" has been applied from that time onward to this sort of windows just as if all the civil buildings, the châteaux and the mansions had not been provided with mansards in the time of Francis I, Louis XIII, and long before their times. But this is one of the weaknesses of the seventeenth century which claimed to have discovered everything. But this is only a claim. It is in this case as in many others of the same epoch. It has been written and said many times, that the wheelbarrow, for instance, was invented in the seventeenth century, at the time when the great work of terracing at Versailles was undertaken; but we have numerous examples of wheelbarrows figured on the manuscripts and painted windows of the thirteenth century. It is true that the form of these little vehicles at this epoch is much more convenient for the laborer than that adopted later than the thirteenth century which we reproduce religiously in our workshops as if it were a masterpiece. It is the same way with the dray, invented, so it is said, by Pascal.

ANOTHER ARCHITECTURAL KNOCKABOUT.[2] — VII.

A Torero of the Cafe.

AT Toledo we were struck by the death-like stillness of the grand old ruined town. It is in truth the Pompeii of Spain, for scarce can one find a human being in its streets, and the very aspect of both the exterior and interior of this crumbling town make one wonder how it can be inhabited to-day. The Cathedral is grand, however, with an interior, more interesting to me than any in Europe. We wandered around looking in vain for the orthodox "Toledo blade," but were only rewarded by the purchase of a pair of indifferent scissors made, they assured us, from the famous steel.

We could not bear the stillness of the old fortress, so after making a few sketches, and seeing its sights, we returned again to gay Madrid to find it thronged for Easter week, and the first of the famous bull-fights. George and I purchased tickets in Sombra, and were much more excited at the prospect of beholding a *bona fide* fight, than even any of the natives.

On Easter day, we went to church in the morning, paraded the Calle Alcale, with its sea of powdered faces and flashy costumes, and in the afternoon started in an open victoria driven by a gorgeous *cochero*, yelling at the top of his lungs to every other vehicle in the avenue on our way to "Los Toros." It is a wonderful sight the drive to the bull-fight, on a superb April Sunday. Every one is there: superb equipages flash past, gay riders and coaches big and little, some drawn by four Arab steeds, with postilions, others by eight, sometimes ten, excited mules, while inside and on top there are as many howling Spaniards as can cling on, all set upon the same errand, the "bull-fight," and a bloody good time.

Entering the gate, we followed the crowd into the ring, promenading over the arena, immaculate in its white sand, soon to be stained with blood and furrowed by the hoofs of frantic horses and bulls. A band of music was doing its best in the centre of the ring, still black with throbbing humanity, while the flutter of white, red, yellow, orange and scarlet skirts and fans betokened the advent of the fair sex in the boxes above, it being most decidedly the thing to attend this the first and best *corrida* of the year. A blast from a bugle, caused the crowd to break for their seats, and the arena was soon empty, and ready for the show. We had our cameras to assist our memories of this memorable scene, and our flasks, too, to help us out should we lose our nerve. Then as the band struck up inspiring strains, the gate opened to admit two alguazils, clothed in black velvet, like ancient "Dons"; taking in their hands their plumed hats, they beg permission of the "Presidente" that the "Quádrillas" may enter and return to the opposite gates. At once a gorgeous sight appears, — first come the mounted "alguazils," then the three heroes of the day, with their train of splendid followers, and behind them the picadors upon their sorry mounts, last of all come the mules covered with tassels, three abreast; then like a golden stream the whole cortege moves slowly and grandly towards us, a superb spectacle, the crowd yelling with enthusiasm, as the parade came to a stand in front of the President's box, and gravely bowed. "Laqalyo," Mazzantini and Gueritta are the espadas, and as they combine the daring skill and elegance of the ring the crowd howls its approval of the bloody prospect before them. In an instant their rich cloaks are exchanged for others as superb in color, though of less value, and everything is ready for the combat. The picadors, lance in hand, edge around the fence, watching for the bull, their poor horses blindfolded over one eye, that they may the more readily be ridden up to the horns of their foe, in the unequal combat. One more bugle blast, and from the dark mouth of the "torel" darts forth the bull, mad with pain from the barbed "moña," with which the owner's colors are fastened to him and which are jabbed into his shoulders just previous to the entrées, blinded by the sunlight, and confused by the sight of the crowd, and the roar that greets him. Seeing the cloak, waving defiantly in the distance, with no other idea than to empale it upon his horns, he makes one wild dash, only to come up with a thunderous crash, against the oaken fence, with his taunting adversary, quietly regarding him from the other side of the barrier. The bull then runs here and there, from one side of the fence to the other, always thwarted in his desire to throw his fleeing adversary; finally tired of this, he rushes to the centre of the ring, and looks from side to side. The picadors had made no sign, but suddenly he saw them, pawed the ground, and then slowly, like a cat, he approached one, the picador turned his horse with the bandaged eye toward the bull; with lance at rest he waited for the charge, then like a thunderbolt the bull came; vainly the picador thrust his lance into the shoulders of the infuriated animal. No wonder this defence is useless, for the weapon has a point of iron only three-eighths of an inch long, protruding from the iron ball, and merely breaks the skin. The horse and rider in a few minutes lay in a heap upon the sand, the man underneath, calmly looking

[2] Continued from No. 914, page 9.

on, with his cigarette between his teeth, his lance shattered, while two feet from him were the horns of the bull, furiously goring the wretched horse to death! In another minute the picador would have been treated likewise, and he knew it, but suddenly between the horns of the bull settled a red cloud, just in time, for the animal turned and rushed madly after "Lagartijo's" cape: coolly playing him to the right, then to the left, the "Maestro" led him away from the prostrate man and dying horse amidst the plaudits of the admiring crowd. The feeling of nausea and disgust that overtook us at the moment of seeing the horse stricken down was fearful. It is the most awful moment of the bull fight, and one that never can be forgotten. We hardly said a word to each other, but as the scene was repeated again and again, the horror of it wore off, to be replaced by mad excitement and a desire to see more.

Six horses were killed, and then the picadors were withdrawn, and the "banderilleros" took the field: alone and unaided, save by a matador or two, they slowly approached the bull, who, curious, as to who this new adversary might be, pawed the sand and watched his foe intently. The banderillero with his pointed arrow-like banderillas in either hand approached the bull and waited for the critical moment. As the animal lifted his head for a charge, quick as lightning (the crowd still as death) the torero leaped forward and put his stinging darts into the shoulders of the bellowing brute, who foamed with rage in his futile attempts to shake them off: three times this was repeated, for six darts had to be affixed to the bull's bleeding shoulders. It certainly was an heroic sight — and I never shall forget how, moved by the contagious plaudits of the crowd, the showers of sombreros, I cried "*Hole Maestro!*" with them all. Now came the third and last act of the bloody drama: a breathless silence fell upon the forty thousand spectators, on this Easter Sunday afternoon, as the great matador, with espada in hand, doffed his cap to the royal box, and the "Presedente" and thus chanted his "Ave imperator te moreturi salutamur."

"Brindo por ucia
Por su noble compañia
La gente d'esta tierra
Y la forastera."

"I toast your worships, your noble company
The people of this place, and the strangers."

Then crossing himself and swinging his cap far behind him into the crowd, he went alone and unaided to meet, to the death, his bellowing antagonist. The animal fiercely charged him, recognizing at once that here was a most dangerous foe, who must be exterminated immediately. The espada avoided him at every onslaught, twisting him with his little red cape here and there; raging and foaming the bull lost all presence of mind, and rushed madly and blindly at the flag alone, in vain; then tired out he remained at a distance, watching for a moment to make a charge. With lowered head he awaited his chance: Lagartijo stood sideways, raised his sword to the level of his eye, sighted along the shining blade, and as the brute was about to lift his head in anger, the maestro leaped forward and thrust his gleaming espada to the hilt between the bull's shoulders. A wild yell of enthusiasm went up from the crowd. The "*estocada*" had reached the bull's heart! Then slowly the dizzy animal looked around the gathering crowd before him for the man who struck his death-blow, and picking him out he made one last dying lunge, and lay dead before him. A shower of hats, cigars and money fell at the maestro's feet, as he walked bowing and smiling around the ring, while the tassled mules, hitched to the dead bull, with a rush dragged his carcass from the gory ring. This ended the

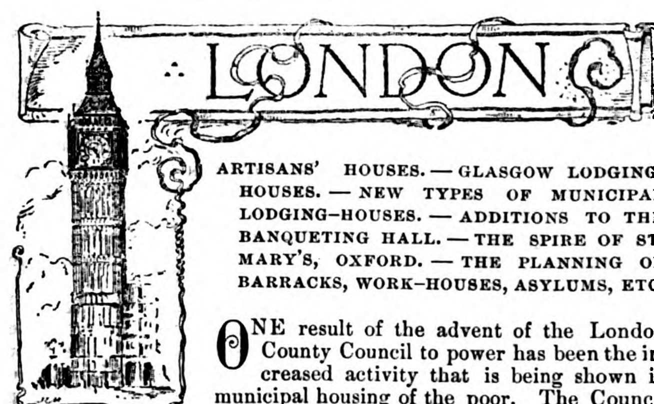
The Alguazils.

event: six times it occurred and six bulls were killed, how many horses can be calculated. The drive home was as gay and as mad as the one before the *corrida*.

In the evening, every café and club in the city was excitedly discussing the day's event. "Hole, Maestro Lagartijo! what a *coup!* Did you notice Guerrita when he slapped the fourth bull's face?" "Yes, but has Mazzântini quite ever been equalled in 'tauromachia?'" And so on through the evening. It seems to me strange that this sport of the bull-fight should flourish in the nineteenth century, yet, in thinking it over and comparing it with others, such as the slow murder of battues of pheasants, the lingering agonies of pigeon-shoots, the brutality of prize and dog fights, and even hunting, where men and horses are sometimes killed, this Spanish "mote" is not much bigger than the Anglo-Saxon "beam."

George and I each bought some banderillas as mementoes, and tried to turn our thoughts away from the painful sights we had witnessed. Finding now that our time and money were getting very short, we decided to make all speed towards Paris. On the way we visited Vittoria, Burgos and San Sebastian, all replete with architectural wonders, then on to the frontier, and finally to Angoulême. How good to be once more in France! F. L. V. Hoppin.

(To be continued.)



ARTISANS' HOUSES. — GLASGOW LODGING-HOUSES. — NEW TYPES OF MUNICIPAL LODGING-HOUSES. — ADDITIONS TO THE BANQUETING HALL. — THE SPIRE OF ST. MARY'S, OXFORD. — THE PLANNING OF BARRACKS, WORK-HOUSES, ASYLUMS, ETC.

ONE result of the advent of the London County Council to power has been the increased activity that is being shown in municipal housing of the poor. The Council predecessors confined their attention to the preparation of sites for artisans' dwellings, leaving the actual buildings to be erected by private enterprise. But it was found that this system involved many disadvantages. The control of the municipality was limited to the approval of the plans and the general supervision of the work, but their safeguards, excellent enough in theory, were not found to work altogether satisfactorily. The influences operating on the minds of the private speculators were necessarily chiefly of a financial character and this did not tend to encourage the highest development of sanitation and general convenience that the available resources might have warranted. I am not saying that work of the highest value has not been executed by the various artisans' dwelling companies; indeed, I suppose that no place presents a more favorable field for studying what is possible in the direction of combined dwellings than London, but while we are thankful for what has been done, we cannot shut our eyes to the fact that much more is possible and it seems that the municipality is the right body to undertake the work. It is not limited as private individuals and to a less extent companies are by the necessity to find money. As much as is likely to be needed is at the municipality's disposal, provided, of course, it is not spent recklessly. Then again it is not limited by the desire to make a profit. So long as the slight percentage that is paid on municipal loans can be produced this is all that is needed. The scale too, upon which work is executed, renders it possible for slight reductions to be made upon the cost of rooms individually.

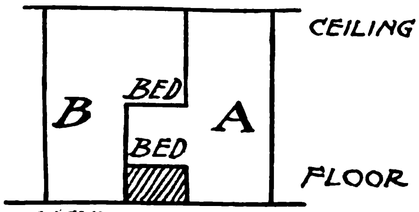
Assuming, therefore, that the same class of buildings were erected by the municipality as is now erected by the companies, it is but reasonable to suppose that a reduction in rental would be the result. But on further consideration this hardly appears to be the case. Influences bear on the municipality that the companies may afford to treat comparatively lightly.

It is compelled to pay very close attention to the increasing demands of sanitation. It is obliged to build in the best manner and cannot very well make those little economies in construction that are practised by private individuals. There are other smaller reasons which tend to swell the cost of building, and, therefore, the development of municipal housing will rather be in the direction of improved accommodation than in the reduction of rental.

The first direction in which the London Common Council turned their attention was to common lodging-houses. The accommodation of this character existing in the metropolis is notoriously of an unsatisfactory nature. The majority of the East End lodging-houses are old insanitary buildings, which have rarely been built for the purpose, but are generally old stores or warehouses adapted. The system of management is frequently of the loosest character and it is not too much to say that London owes much of its crime and poverty to the wretched character of these houses. London was, as usual, forestalled by a provincial municipality in its effort to reform the common lodging-houses. The City of Glasgow has already erected seven lodging-houses for men and one for women. They have resulted in a slight financial profit to the city. The sanitary arrangements, however, are even here open to criticism. The cubicles are in pairs, superimposed like the berths of a ship. This arrangement is not in itself good, but it becomes still more objectionable when we realize that there are four rows of cubicles to each dormitory, and that the two centre rows are unlighted and unventilated.

The Council felt that this plan might be improved upon, and determined that each separate cubicle must be self-contained between

vertical divisions running from floor to ceiling and that it must have its own window. This result was arrived at by arranging the cubicles in galleries running right round halls or pavilions. The building in which this experiment has been carried out consists of three of these pavilions arranged with their longer diameters parallel. Each pavilion accommodates 104 men and consists of two galleries besides the cubicles placed on its floor. Each cubicle has its own window and is ventilated by fresh air warmed by passing over hot-water coils; the extracts being by large lantern-lights in the roof. Each lodger is provided with a comfortable spring-bed and box for his clothes.



SECTION THROUGH A PAIR OF CUBICLES

The day-accommodations consist of a large day-room provided with books, newspapers, a piano and other little comforts, I had almost written luxuries; a dining-room fitted with all conveniences for cooking; a shop managed by the superintendent where men may get food and tobacco and other little wants; a locker room giving a private locker to each man, lavatories, feet-washing basins, plunge and shower baths, a room for lodgers' washing and drying their clothes, a workshop, laundry, etc. This accommodation is provided for the sum of 5*d.* per night per man and at this price it has been found to pay its way. It is, as might be expected, very popular; applicants, many coming from a distance, are nightly turned away.

The combined dwellings, which are now being erected in various parts of London, are of the same nature as those already erected by the companies, but of an improved type. Each tenement for example, is entirely self-contained and consists of a living-room, one or two bedrooms, a scullery containing sink and copper, a disconnecting lobby open to the outside air, from which the water-closet is approached. Particular attention is given to through ventilation and each tenement is so arranged that by opening doors and windows a thorough blow through is obtained and the rooms properly cleansed of foul air. No building is allowed to approach within an angle of 45° drawn from the bottom of opposing properties, and more care is being bestowed upon the design and finish generally of the buildings than is usually the case.

A third type of building which is being tried is the cottage. Terraces of self-contained and double cottages are being erected in the more distant parts of the metropolis and seem likely to become popular.

The Council have, I understand, been approached with the view of constructing a woman's lodging-house on parallel lines to that erected for men and seem to be entertaining the proposal.

The chief argument that has been urged against municipal enterprise in this direction is the tendency that it will have to stifle private enterprise, but this prophecy has not yet been in any way verified. London is large enough to provide room for many persons to work and if the ultimate result proves to be the general improvement of the whole of this class of buildings, the slight risk of interference will be held by most people to have been justified.

The competition for the new building for Christ's Hospital has now been put into order. A modification of the competition system has been adopted. Architects used to the planning of schools were asked to submit their names, and one hundred and thirty responded to the invitation. Of these, five were selected, namely: Mr. T. E. Colcutt, Mr. T. G. Jackson, Messrs. Aston Webb & Bell, Messrs. Paley & Austin, and Mr. Ingelow. Each of these gentlemen will receive a fee of £400, and the author of the selected design will carry out the building. A competition for an important public school of this magnitude is an unusual occurrence in England, and should bring forth some interesting designs.

Messrs. Aston Webb and Ingress Bell have published their design for the extension of Inigo Jones's Banqueting-hall at Whitehall. It will be remembered that the building was until recent date used as a chapel royal, but lately the Queen has handed it over to the Royal United Service Institution for their museum. The new portion is an extension to the southward, and it was very difficult to avoid either injuring the effect of the Banqueting-hall and yet to design the addition in harmony. The design shows the pains which have been taken to solve the problem, and, perhaps, at the same time serve to show how very difficult a satisfactory solution really is. The new part is lower than the old, and is set back so as not to destroy the retained pilasters which flank the banqueting-hall. It is not to be used as a museum, but for a lecture-room and offices. The lecture-room is semicircular in plan, and faces the Whitehall Gardens side of the Banqueting-hall, so that on this side the elevation shows a distinct departure from the comparative severity of the old building.

An animated discussion is proceeding in Oxford over the restoration of the spire of the University Church of St. Mary the Virgin. This spire has had many vicissitudes of fortune. In mediæval times, damage was occasionally done to the spire and pinnacles by the weather, and, about the beginning of the seventeenth century, the Jacobeans restored the pinnacles in their own peculiar way. Forty years ago, in the early days of the Gothic revival, a Mr. Buckler had the handling of the spire, and he substituted for the Jacobean jumble the complicated and ill-proportioned angle-pinnacles that are familiar to all visitors to Oxford. The stone used, however, was so bad as to again need repair. Mr. T. G. Jackson suggests the advisability of reducing the pinnacles to what was more probably their original form, and so improving the proportion of the spire. Both his design and two others from Messrs. Bodley & Garner and Mr. Parker, respectively, are under the University's consideration, and much feeling has been engendered as to the proper course to take. The matter is to be settled by the Oxford dons in congregation, and there is every prospect of an animated discussion.

We are indebted to Mr. Gordon Smith, the architect to the Local Government Board, for an interesting address on hygiene in its connection with buildings. He explained that he did not propose to deal with defects of drainage or water-supply, nor with defective construction of walls, foundations and roofs, but simply confine himself to the general arrangement of buildings from a hygienic point-of-view, and he considered, as an example, the case of military barracks. Although soldiers are generally men of robust health, selected with special reference to their good physique, experience has shown how terrible is the effect of badly-planned barracks. In 1857, the mortality of the troops was nearly double that of the male civil population, and it was not until an improved system of barrack-construction was introduced that this percentage was materially reduced. The barracks constructed in England since 1872 comprise a number of wholly detached blocks, the residential blocks being confined to two stories, and holding some 80 to 120 men. This improvement is being noted and gradually adopted by the chief European powers.

The rules for barracks apply equally to many other classes of buildings intended to hold a number of human beings. The same subdivisional blocks or pavilions are now regarded as essential, and the newer prisons form a striking contrast when compared with the older prisons of Millbank and Newgate.

The same developments had taken place in the construction of workhouses and lunatic asylums. Most of these buildings, however, were either erected directly by the Government or under Government control, and, consequently, there might be a reasonable expectation that the more modern demands of sanitation would receive attention, but there was no control over the construction of charitable institutions, such as orphanages, asylums for idiots, the blind, etc., and the higher class schools and training-colleges. Consequently, all kinds of plans were adopted: some good, some indifferent and some very bad. He felt the tendency to group a large number of children together into one building was a wrong one, and tended to encourage the production of ophthalmia, diseases of the skin and scalp, and other troublesome disorders. He therefore advocated the adoption of the opposite principles of segregation as far as possible. He investigated several experiments which have been made in England in the direction of the cottage-home arrangement for schools, and considered the results to be so satisfactory as to justify further experiments on a larger scale. In view of these considerations, he looked with no small anxiety at the enormous aggregation of children in many of the public elementary schools, where they assembled not only in large numbers in their respective school and class rooms, but where these rooms are piled up to several stories and arranged so that the vitiated air was apt to be diffused throughout the entire building by means of the staircases and corridors.

With regard to hospitals, he felt that the pavilion system of hospital-construction was often abused, and that it was not carried out in England as completely and as thoroughly as in the best examples of modern hospital-construction in France and Germany. He referred to St. Thomas's Hospital as one of the finest British hospitals, and yet in this he found huge wards piled up one upon another in four stories, with a basement for stores, etc., beneath them, and dormitories for nurses and servants in an attic above them. Not only were these wards intimately connected with each other by spacious staircases from basement to attic, lifts for patients, lifts for coal, food, etc., and shoots for ashes and soiled linen, but, as if there had been a distinct intention to assimilate the whole institution as much as possible and to counteract the effect of the pavilion system, the several pavilions, each holding some 112 patients, were connected through enclosed corridors on the basement, ground and first floors. The segregation of patients was carried to a much greater length in the best modern foreign hospitals than in England, for, as a general rule, the ward blocks rarely exceed one story in height, and are practically never more than two stories high, while the number of patients under one roof or in one ward is much less in our English and Scotch hospitals. He referred to other plans for improving the construction of hospitals, and summed up strongly in favor of segregation whenever possible. His lecture has received a good deal of attention in scientific and architectural circles.

TO LIMIT EXPLORATIONS IN PERU. — Apparently the Peruvians have taken alarm at the spoliation of objects of historical interest which they have been suffering in late years, for a report to the State Department from the Consul-General at Lima states that the President has issued a proclamation and a decree intended to stop further unauthorized depredations. The proclamation states that the explorations in pits and ruins have been carried on without order and without any other object than to satisfy individual interest, but that archæologists will conduct their searches hereafter under closely guarded permits. — *New York Evening Post.*

FAILURE OF THE ARCHITECTURAL CLASSES. — PUBLIC STATUARY. — THE TECHNICAL COLLEGE. — VERANDA *vs.* ELECTRIC WIRES: A CURIOUS LAWSUIT.

SYDNEY, N. S. W., April 17, 1893.

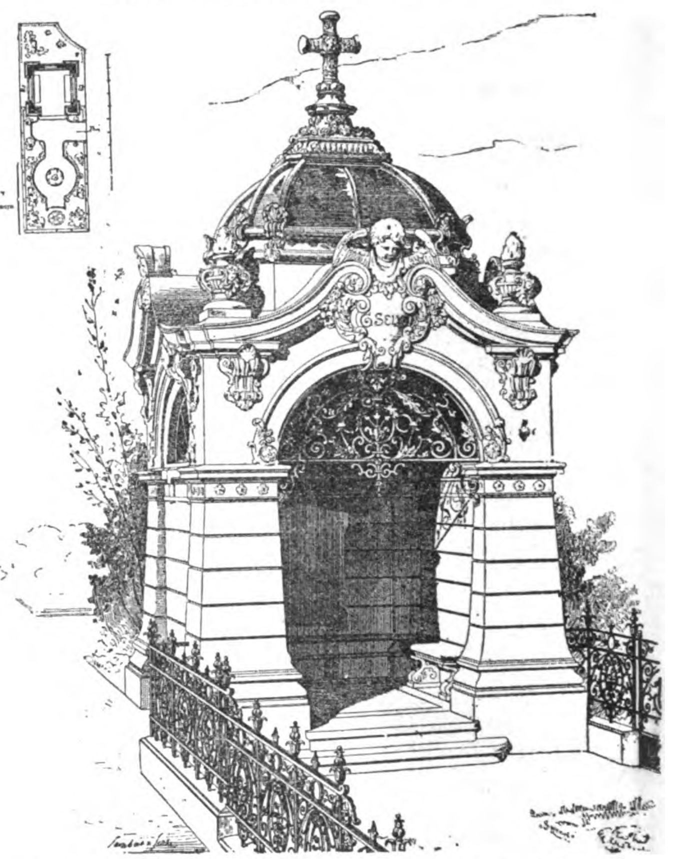
THE opening meeting of the session of the Sydney Architectural Association under its new President, Mr. George Oakeshott, A. R. I. B. A., though well attended, was not marked by any of that enthusiasm which was so characteristic of the earlier meetings. The Presidential Address, too, while alluding with a pardonable pride to the good work already done by the Association, regretted that the pupils and junior draughtsmen showed such a lamentable lack of interest in the efforts made for their benefit that the classes, which were from "the first poorly attended, . . . finally drooped and died." The fact of the matter would seem to be that Australian enthusiasm is not long-lived, and, moreover, we have not yet arrived at that stage in our life as a nation when we may expect to have a due appreciation of anything pertaining to art. Commercialism is still rampant, and this, perhaps, explains the extraordinary apathy evinced by our people with regard to artistic matters, otherwise it would be difficult to explain the astonishing complacency with which the public view the disfigurement of the public buildings by such atrocities in the way of statuary as now disgrace the New Lands Office here. In their way, these statues are feebler, and, consequently, worse, than the notorious monstrosities which still grin at us from the spandrels of the General Post-office. That magnificent reserve, too, dedicated a few years back, and now known as the Centennial Park, is studded with a heterogeneous crowd of statues of people more or less celebrated. These effigies in marble were — I believe I am correct in so stating — bought as a "job-lot" in Europe and imported here by an enterprising monument-maker, and, after adorning his yard for years, were eventually disposed of by him for a good round sum to the Government, who had a new park, and were anxious to have some work of art placed in it for the edification of the people whose money they were expending.

There has lately been completed in Sydney a large pile of buildings, which the State has erected for use as a Technical College. From a professional standpoint, they are not an architectural masterpiece, but they have cost a great deal of money, and the classes held in them are popularly supposed to be effecting a vast amount of good. They may be, but it is doubtful whether such institutions do not undermine to a great extent the old system of apprenticeship, without giving any compensating advantages. As an auxiliary, this system should be extremely valuable, but there would seem to be a danger of educating young men in the various arts and the trades connected with them who will blossom into full-blown craftsmen without any insight into the practical working of the particular craft they profess other than that which they are able to obtain within the walls of the College. Take the department of architecture, for instance; as the classes are held in the evening, many who earn their living in following other occupations are enabled to obtain the necessary instruction to allow them to compete in the annual examinations held in connection with South Kensington. If successful in obtaining an award — and, by the way, the publication in one of our professional journals of a set of drawings to which were awarded a bronze medal does not give one an exalted idea of the South Kensington standard — the student may not, unnaturally, imagine he is fully competent to call himself an architect, and, if he has sufficient capital, start in practice without further delay. The experience which can only be obtained in the routine of actual office-work he has *not* acquired; he may be a draughtsman, but his education as an architect will have to be obtained at the expense of his employers. For the *bona fide* architectural student, the classes of the Architectural Association, or similar institutions, should be infinitely more beneficial.

A late lawsuit here, the Attorney-general *vs.* E. Way & Co., furnishes a curious exemplification of a divided authority. The defendants had lately built large shops and warehouses in Pitt Street, and, as a veranda was required over the foot-path, a design for one was prepared by the architects which, it was considered, would harmonize as much as possible with the handsome façade to which it was to be attached. The consent of the City Surveyor was obtained in the usual way, and the veranda duly erected. The telegraph authorities then discovered that the ornamental parapet of the structure came in close proximity to their wires, and they forthwith requested the owners to remove, not the parapet, but the veranda! This request, it is needless to say, was not complied with; hence the action, which was decided against the defendants. The cost of altering the position of the wires would have been trifling, and the defendant offered to bear a portion of it, but his offer was contemptuously rejected. So the veranda, it is to be presumed, will have to be taken down.

In these days of depression, it is gratifying to be told by the English Secretary of State for Foreign Affairs that "Sydney is the most exquisite spot in the world; its harbor is a paradise of waters beyond the ken or imagining of man; and the people represent the brightest and best qualifications of the British race." It was at a farewell banquet given to the Governor-elect of New South Wales that Lord Roseberry spoke, and possibly these things look brighter through "a vinous mist"; but of late the denizens of this region have begun to look at it as the overgrown metropolis of a land of floods and financial disasters. At least, that is the view the architects take of it.

AMERICAN SILVERWORK.[1]



Tomb at Sudenscheid, Westphalia. From *Architektonische Rundschau.*

INTO the economic causes which have led to the vastly increased use of what we are accustomed to call a precious metal, this is not, I conceive, the exact place, nor am I a fitting person, to inquire too closely. It is, however, apparent that the enormously increased output of silver from the newly discovered mines in Colorado, and other of the Pacific States of America, has played the chief part in the increased and increasing use of the metal in question. Since the discovery of America, for instance, silver has been produced to the value of no less than £14,000,000,000, of which only £3,000,000,000 can be accounted for in existing coinage. This means that £11,000,000,000 worth have either been used in the arts, or practically lost to us. This enormously increased output, a great part of which has, as I have said, taken place in comparatively recent years, has naturally affected the intrinsic value of the metal; that is to say, its ratio to-day as compared with gold, is only about half of what it was 500 years ago. The Roman ratio was, in the early days of the republic, 10 of silver to 1 of gold, and subsequently increased to 12 to 1. The discovery by Spain of the mines of Potosi, raised it to 13½ of silver to 1 of gold, at which it remained until the end of the seventeenth century, when the Portuguese practically governed the rate, and raised it to 16 to 1. In the last few years it has approached more nearly to the ratio of 20 to 1 than has ever been known in the world's history. This relative cheapness of the metal has, doubtless, led to its more general introduction into our daily life. Be the cause what it may, however, the fact is certain, that one cannot walk down Bond Street or Regent Street without seeing, in every other shop-window, trinkets and nicknacks, personal ornaments and household utensils, glittering in all the untarnished radiance of the white metal. Nor to silversmiths proper is this display confined, but silver trifles, either for use or ornament, find a place in the windows of half-a-dozen other tradesmen and artificers. If this be the case in London, still more so is it in New York, where it would be difficult to find any article of daily use which one cannot procure, either entirely fashioned of silver, or in the adornment of which silver plays a most prominent part. . . .

When, however, we come to consider more closely, and compare the actual manner in which this fashioning is effected in the two

[1] A paper read by H. Townsend before the Society of Arts and printed in the *Journal* of the Society of Arts.

countries, we are struck at once by the wide difference of method, almost of principle, employed. Roughly speaking, we may say that the silverwork of England is a tradition, and that of America a discovery. The silversmith on this side of the water is hampered, I freely admit, in some directions. The mere fact of the standard fineness of his metal being rigorously guarded by law, while it has allowed the uninformed public to form a more sure estimate of the intrinsic value of his wares, has, in some mysterious way, lessened their artistic importance. For the last 200 years, at least, some sort of check seems to have been placed in this country on the manufacture of silver, though it was not until the beginning of the fourteenth century, I believe, that any actual legislation upon the subject was put into operation. It was then decreed that a leopard's head should be stamped upon all sterling articles of gold and silver. In the year 1337, the Goldsmiths' Company of London was incorporated by Edward III, and this body, until the present day, have been wont to imprint their company mark, which is the same leopard's head to which I have referred, upon all articles of sterling silver which are manufactured in London. As you are doubtless all aware, there are six other assay offices in this country, namely, those of Birmingham, Chester, Sheffield, Edinburgh, Glasgow and Dublin. The Hall-mark, which, by these offices, is stamped upon the articles of gold and silver, is evidence that these have been tested and the latter found conformable to the invariable standard of 92.5 per cent of silver, and 7.5 per cent of alloy, or 11 ozs. and 2 dwts. of fine silver to 18 dwts. of alloy. Although there is now no duty on gold or silver plate, the Hall-marking is practically compulsory, and not only this, but foreign plate, although it comes in free of duty, must be marked before being placed on sale, and, in addition to the ordinary Hall-marks, have the letter "F" enclosed in an oval escutcheon. There is no manner of doubt but that this legal hampering of a trade or art which ought fairly to be as free as any other has seriously checked its development, at all events as regards what might have become many important branches of the main stem. At present it is enough for me to point out that in America no such system prevails, and that to this fact is in some measure due the greater artistic freedom and originality which I hope to convince you is the distinguishing feature of the American silverworker. . . .

The most strenuous note in the American artistic character is a reflex of that which dominates their political faith. It is that of freedom, or, as in connection with art matters the word might be spelled, originality. This, though at times it is apt in art as in politics to degenerate into license, is in the former happily restrained by that other, and perhaps more hopeful, American characteristic, appreciativeness. As in their architecture so in their subsidiary arts, the Americans seem unconsciously to assimilate, in a degree unknown to nations fettered by the bonds of tradition, all that is good in the art work of other peoples, and at the same time to impart to the conglomeration thus obtained a distinct flavor of their own individuality. . . .

We may say what we will about American art work; we may abuse it (and in many cases we are perfectly justified in doing so) as being vulgar and *outré*, we may accuse it (and with justice) of an uneasy restlessness, which detracts to a large extent from its undoubted originality and cleverness; but in ninety-nine out of a hundred cases we find that it possesses the redeeming quality of interest. In no other branch of American art, and in no other American craft, is this quality more patent than in the silverwork. This I take it is the chief lesson which our silversmiths on this side of the Atlantic have to learn from America. Let me take as an illustration the most common and ordinary articles of household use. The peculiar qualities of silver, its malleability, its ductility, its practical freedom from oxidization, and its indifference to the action of certain acids, render it not so much a luxury as a necessity for certain of our household utensils. Even the most economically-minded householder must, therefore, reckon among his belongings a certain number of silver spoons and forks. The intrinsic value of the metal would lead one to suppose that a certain amount of additional cost, in respect to the manual labor of fashioning it, might well be bestowed upon it. The articles which are made from it, and of which I now speak, will last more than one lifetime, and are constantly and recurrently put before our eyes, morning, noon and night. It would certainly seem, therefore, that we are not asking too much if we demand from those who are responsible for their production, a certain amount of individuality and freshness of design as well as technical skill and soundness of workmanship. But in England there exist, among trade silverworkers, as I have already hinted, a more than slavish adherence to tradition and a slothfulness of mind, as it were, which no other craft can parallel. The spoons with which I eat my soup in my house I find reproduced in all their clumsy, heavy artlessness at the house of the neighbor I visit to-morrow, and were I to dine out in this England of ours on 300 of the 365 evenings of the year, I doubt whether in the whole of that time I should handle more than three distinct patterns of silver plate. In America the case is far different, in that one finds in a majority of households a display of table-ware which has been constructed to an original and a unique design. Not that each one has his table-ware made especially to order, but the varied assortment of trade patterns of silver-ware which are found not only at Messrs. Tiffany's, but at half-a-dozen other silversmiths' establishments in New York, Philadelphia and Boston, renders it easy for the householder to choose some such variation from the standard and accepted shapes as will reflect more or less his own idiosyncrasy. Thus one finds that a New York dinner-table has something to attract one's attention and call forth either admiration or the reverse, while it gives also some clue, howsoever slight, as to the presence or absence of artistic taste and knowledge on the part of one's host. . . .

As an Englishman I cannot help experiencing a sort of vicarious shame when I go into shop after shop, house after house, and see the same painfully glittering and meaningless surfaces, the same commonplace curves, the same lifeless ornamentation, and compare them all, in my own mind, with the constant delight and pleasure I experienced in New York as I turned over the contents of an ordinary shop show-case, or called upon some friend whose acquisitive faculty had led him in the direction of silver-ware. Here in England we are content, not so much to endeavor to revivify a corpse, as to hospitably entreat, and to be perfectly satisfied with the presence at our feasts of the mere mummy of an art. To travel out of the path beaten by the hammers, or the ruts cut by the gravers of two centuries ago, seems to the English smith not only useless, but positively vicious. His fashions may change, perhaps, but they change only as regards the model he is content to slavishly follow. When he is a copyist he is too often soulless; when he summons courage enough to be original he is generally mindless. In America, on the contrary, he is ever on the lookout, not only among the archæological dust-heaps of the centuries, but in the world of science of to-day, and the almost newly-discovered world of still living Oriental art. From science he has borrowed many a secret of metallurgy. From the East, and from Japan especially, he has learned many a lesson of form and color. He has pressed into his service, sometimes, I own, with unwarrantable rapacity, the methods of other arts. He has not been content to simply engrave the surface of his metal, but has yearned for and obtained the freedom and facility of the etcher's needle. As regards this liberal and broad-minded subjection to outside influences, there is much that is worth consideration in the different attitudes which the English and American silversmiths have respectively assumed towards the marvellously beautiful and ingeniously scientific alloys which, under the names of shibu-shi and shakudo, the Japanese have known and cunningly worked for centuries; or towards the equally beautiful effects gained by the same artificers through the use of patinas, which give to silver and its alloys a bloom as of a sun-kissed peach or ripened plum. The English have passed them by with timorous indifference; the Americans have spent large sums of money and an infinity of thought and care, and while deftly refraining from any servile copying, have adapted rather than translated these foreign arts into their own language. You will see two or three examples of the curiously welded alloys to which I refer among the little collection here, and I would beg you to especially note that while the Japanese influence is strong, none of the pieces I have here could by any possibility be mistaken for examples of native Japanese workmanship.

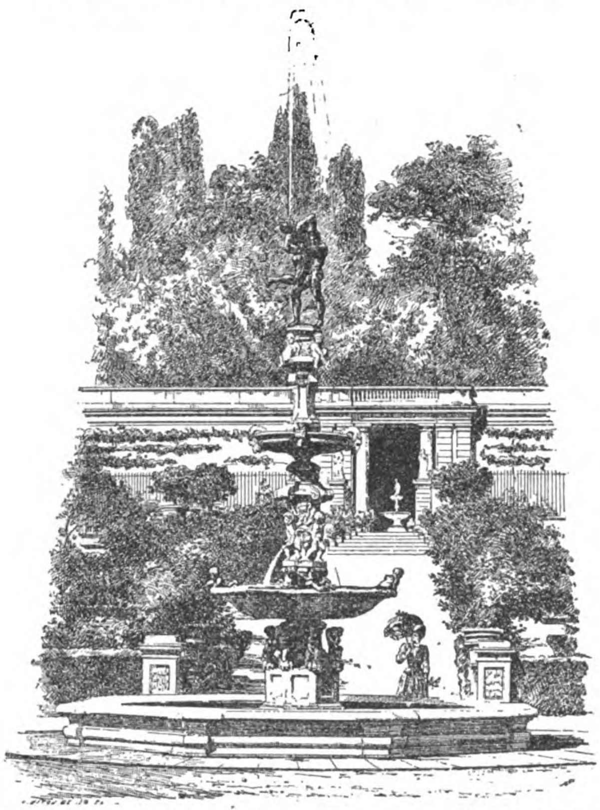
It is, in fact, the strong desire of the American workman to avoid any appearance of actual copying, while I am afraid his English brother, supposing him to have the necessary skill to work in so ingenious a fashion, would use his utmost endeavor to turn out something which, in its imitative fidelity to the original, should deceive an expert Japanist. Even when he does not care to expend the time and labor necessary to produce these beautiful but necessarily expensive articles, the American silversmith has an eye for color, and for the effects of contrast, which is apparent in some other of my examples. . . .

I have been endeavoring, in sufficiently brief fashion, to impress upon you the fact that one at least of the arts of a country we are far too apt to consider as given over to the outward barbarian is worthy of our most respectful consideration. But let me insist that anything I may have said which appeared derogatory to our English work is meant to apply simply and solely to those articles of silverware which any one can buy in any Regent Street or Bond Street shop, and, on the other hand, all that I have brought forward in favor of the American work, as compared with our own, is confined equally to the same class of articles.

I have seen in England specimens of artistic work in silver and other metals which will compare most favorably with the creations of the cinque-centists and mediæval metal-workers, but almost invariably this work has proceeded from the studios of sculptors of eminence, or from the workshops of amateurs. I am not, of course, so foolish as to belittle the marvellous creations of such an artist as Mr. Gilbert, or even to undervalue the skill of Professor Herkomer, who, at his house in Bushey, has for some time been producing to his own design a service of carefully-modelled silver, which has much of originality to commend it.

In one respect, however, I may say a good word for our countrymen at the expense of the American. Ecclesiastical silver-ware is to be found in some workshops here which cannot be paralleled either in American or in any other country in the world for its adherence to the best traditions of the mediæval craftsmen. It is more than archæologically correct, it is alive with the true spirit of the devotionally-minded silverworkers of an age when religion permeated the life of the artisan as well as of the priest. It is worth noting, by the way, that the same holds true as regards their architecture also. The American church work cannot be compared in any respect to the best of ours, though some of us are bold enough to consider that in domestic and commercial buildings they have a great deal to teach us.

THE SALE OF GEORGE SNELL'S LIBRARY.

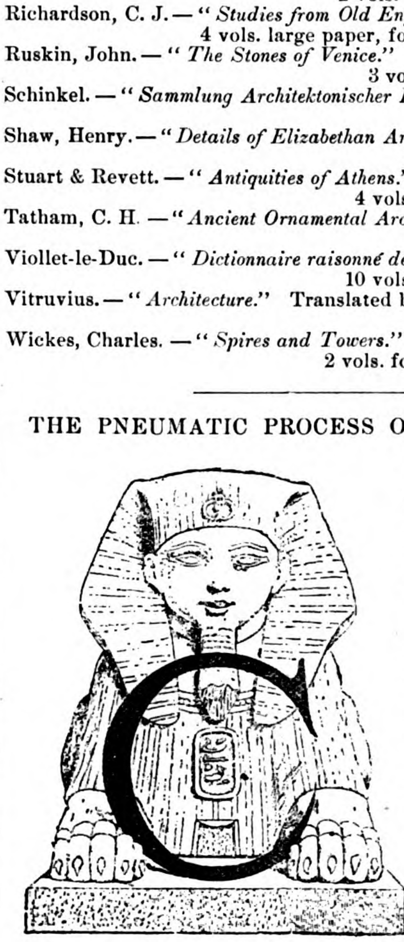


Fountain of Hercules, Villareale, Castello, Italy. From *La Semaine des Constructeurs.*

THE books which belonged to the late George Snell were sold by auction at Messrs. Leonards' rooms in Boston, June 9. Below is given a list of the prices brought by some of the most important architectural works, which our readers may find of some value for future reference. The total amount realized by the books was about $2,400, the catalogue containing 394 numbers.

Agincourt, Seroux d'.—"*Histoire de l'Art par les Monumens.*" 6 vols. folio, Paris, 1823. $21.00.
Brandon, R. & J. A.—"*Analysis of Gothic Architecture.*" 2 vols. quarto, London, 1849. $8.00.
Britton, John.—"*Cathedral Churches, and Architectural Antiquities of Great Britain.*" 10 vols. quarto, London, 1821–35. $50.00.
Canina, Luigi.—"*L'Architettura Egiziana, Greca e Romana.*" 11 vols., Rome, 1839–44. $44.00.
Coste, Pascal.—"*Architecture Arabe.*" Folio, Paris, 1839. $10.50.
Coste, Pascal.—"*Monuments Modernes de la Perse.*" Folio, Paris, 1867. $20.00.
Daly, César.—"*L'Architecture privée au XIX^{me} siecle sous Napoleon III.*" 3 vols. folio, Paris, 1864. $12.00.
Durand, J. N. L.—"*Recueil et Parallele des Edifices.*" 2 vols., Brussels. $27.00.
Fergusson, James.—"*History of Architecture.*" Second edition. 4 vols. 8vo, London, 1874. $22.00.
Gailhabaud, Jules.—"*Ancient and Modern Architecture.*" 2 vols. quarto, London, 1844. $8.50.
Gell, Sir William.—"*Pompeiiana.*" 2 vols. 8vo, London, 1837. $5 00.
Gourlier et Biet.—"*Choix d'Edifices Publics.*" 3 vols. folio, Paris, 1825–50. $42.00.
Gwilt, Joseph.—"*Encyclopædia of Architecture.*" 2 vols. 8vo, London, 1842. $6.00.
Hittorf et Zanth.—"*Architecture Moderne de la Sicilie.*" Folio, Paris, 1835. $20.00.
Intime Club.—"*Croquis d'Architecture.*" 8 years. Folio, 4 vols., Paris, 1868–74. $26.00.
Jones, Owen.—"*Grammar of Ornament.*" Folio, London, 1856. $28.00.
Jones, Owen.—"*The Alhambra.*" Large paper. 2 vols. folio, London, 1842. $52.00.
LeKeux, J.—"*Memorials of Cambridge.*" 2 vols. 8vo, London, 1842. $6.50.
LeKeux, J.—"*Memorials of Oxford.*" 3 vols. 8vo, Oxford, 1837. $8.25.
Letarouilly, P.—"*Edifices de Rome Moderne.*" 6 vols., Paris, 1840–57. $87.00.
Montfaucon, B. de.—"*Antiquity explained and represented in Sculptures.*" 5 vols. folio, London, 1721–22. $16.25.
Nash, Joseph.—"*Mansions of England in the Olden Time.*" 4 vols. folio, London, 1839–45. $50.00.
Neal, J. P.—"*Westminster Abbey.*" 2 vols. quarto, London, 1818–23. $6 00.
Nesfield, E.—"*Mediæval Architecture.*" Folio, London, 1862. $4.00.
Normand.—"*Paris Moderne.*" 2 vols. quarto, Paris, 1837. $6.00.
Parker, J. H.—"*Glossary of Architecture.*" 3 vols. 8vo, London, 1845. $6.75
Percier et Fontaine.—"*Choix de plus célèbres Maisons de Plaisance de Rome.*" Folio, Paris, 1809. $13.00.
Pfnor, Rodolphe.—"*Monographie du Palais de Fontaineableau.*" 2 vols. folio, Paris, 1863. $18.00.
Piranesi.—"*Works.*" Over 1,000 plates. 24 vols. folio, Rome, 1756–90. $252.00.
Pugin, A. W.—"*Glossary of Ecclesiastical Ornament.*" Quarto, London, 1846. $10.00.
Pugin, Augustus.—"*Gothic Ornaments.*" Quarto, London, 1844. $2.75.
Pugin, A.—"*Specimens of Gothic Architecture.*" 2 vols. quarto, London, 1825. $7.00.
Richardson, C. J.—"*Studies from Old English Mansions.*" 4 vols. large paper, folio, London, 1841–48. $61.00.
Ruskin, John.—"*The Stones of Venice.*" 3 vols. 8vo, London, 1853, $60.00.
Schinkel.—"*Sammlung Architektonischer Entwürfe.*" Folio, Berlin, 1836. $7.50.
Shaw, Henry.—"*Details of Elizabethan Architecture.*" Quarto, London, 1839. $5.00.
Stuart & Revett.—"*Antiquities of Athens.*" 4 vols. folio, London, 1825. $38.00.
Tatham, C. H.—"*Ancient Ornamental Architecture.*" Folio, London, 1799. $10.00.
Viollet-le-Duc.—"*Dictionnaire raisonné de l'Architecture.*" 10 vols. 8vo, Paris, 1854–75. $40.00.
Vitruvius.—"*Architecture.*" Translated by Joseph Gwilt. Folio, London, 1826. $4.00.
Wickes, Charles.—"*Spires and Towers.*" 2 vols. folio, London, 1854–55. $10.00.

THE PNEUMATIC PROCESS OF SINKING A PIER.



CONSIDERABLE has been said in a general way about the size and main features of an office-building which the Manhattan Life Insurance Company is about to erect in lower Broadway, New York, nearly opposite old Trinity Church. A former Rhode Islander, now engaged in business in New York, told the writer the other day, that he had seen Broadway practically rebuilt since the war, and it will certainly be a cause for amazement to find Trinity's spire, once considered a landmark on account of its great height, overtopped by habitable floors of a building over the way. The building is to be sixty-seven feet three and one-half inches wide on Broadway, sixty-six feet seven and three-fourths inches on New Street, 119 feet seven inches deep on the north line and 125 feet one-half inch deep on the south line. It will be sixteen stories high on the Broadway front and seventeen stories on New Street. The main building will have a height of 242 feet to the top of the main roof and from the Broadway sidewalk to the base of the flagstaff on top of the dome the distance will be 348 feet. A few years ago it would have been impossible to erect a building as lofty as this is proposed to be upon such a site without surrendering so much of the lower floors to caring for the foundation load as to render them practically untenantable. It is believed that the Tower Building, a neighbor to the proposed new structure, was the first example of a tall building erected upon a narrow site in which foundation loads were properly carried without the surrender of this valuable ground-space, and the lesson then learned has been turned to practical account since by metropolitan builders in many instances. The Manhattan Building will be unique, however, in the adoption of two of the processes or principles of bridge construction, the pneumatic process of sinking a pier and the cantilever principle of distributing the load of the columns over the piers formed by the caissons. Fifty or sixty feet from the surface is rock which it was desired to reach with the foundations. The rock was covered with mud and quicksand. The building-line upon each side was bounded by existing structures, some of them upon pile foundations, and it was of the greatest importance that these foundations should be protected and supported.

It is stated that small caissons had been employed in sinking foundations for one of the theatre buildings recently erected in New York, but they were put down by mechanical means, no air-pressure being employed, and in magnitude and importance they bore very slight comparison to the undertaking now in progress. The caisson considered as an aid to sinking foundations through wet material consists of an inverted box having a sectional shape according to the work it is intended to do. The principle is, that so long as the air-pressure in this box is maintained equal to or slightly above the water-pressure upon the outside down to the lower edge of the caisson, water cannot enter. Work is carried on in the chamber formed

by the caisson, in many cases the work of laying the masonry on top of the caisson being carried on at the same time. As excavations advance, the caisson sinks, the air-pressure in the inside being reduced slightly until the dead weight of the caisson itself and the masonry on its top are sufficient to overcome the frictional grip or resistance due to the bearing upon the outside surface of the material it is passing through. There are fifteen caissons, some of the largest being twenty-five feet six inches by twenty-one feet six inches, twenty-five feet by fifteen feet six inches, and thirty-six feet by eleven feet. The air-pressure is not expected to exceed twelve to fifteen pounds to the square inch, equivalent to twenty-seven to thirty-four feet head of water. After caissons have been sunk to the bed-rock they are to be cleaned out and filled with concrete, thus forming a continuous masonry pier from the rock up to the surface of the ground. On these rest thirty-two main columns carrying the building, the load being brought to the centre of the top of each pier by a system of cantilevers of plate-girders built up in box form. This system is so thoroughly worked-out in all its details that although at some places end columns are outside of the outside edges of their respective caissons the load they bear is transferred by means of the cantilevers and bolster shoes so as to be evenly distributed over the base of the piers formed by these caissons. — *Providence Journal.*

NOTES ON GESSO-WORK.

XV-Century Repoussee Work. From Havard's "*Dictionnaire de l'Ameublement et de la Decoration.*

DECORATIVE design in gesso stands, it may be said, midway between painting and sculpture, partaking in its variations of the characters of each in turn — the younger sister of both, holding, as it were, the hands of each; playful, light-hearted, familiar, associated in its turn with all kinds of domestic furniture and adornment.

With an origin perhaps as ancient as the practice of decoration, its true home is in Italy. We find it at Pompeii in association with architecture and painting, with its cousins stucco and plaster-work, which are also found in such choice and effective forms in the interior decoration of Roman tombs, such as the famous ones of the Latin way. We find it united with painting in the devotional pictures of the early Italian school, used for diapered backgrounds and gilded enrichments of all kinds, jewels of kings, and nimbi of saints. There exists a painted screen in Southwold Church, of a fifteenth-century Flemish character, though possibly English, which has figures of the Apostles with diapered backgrounds in raised gesso-work; and in the fine decorative scheme of Pinturrichio in the Appartimenti Borgia in the Vatican, gilded gesso is used for caskets and other ornamental features in the frescoes painted on the walls, gilded relief-work being out on the vaulted ceilings above. A beautiful model (by Sig. Mariano) of one of these rooms may be seen in the Italian Court of the South Kensington Museum, as well as a multitude of excellent examples of gesso-work in pictures and mirror frames, and in the *cassone*, or gilded marriage-coffers, of which there are several very fine ones, mostly Florentine, with figures in relief, and backgrounds punctured or stamped in patterns on the paste, and afterwards gilded, with rich ornamental effect.

We find gesso was used also underneath the burnished gold of the mediæval illuminator, and it enabled him to give that rich and sparkling effect, united with bright and rich color, in the massive initial letters and raised leaf-work which give such value to English and French fourteenth-century MSS.

The revival of classical feeling — which was never far hidden in Italy — and the love of classical lore and detail at the time of the Renaissance, led to the use of stucco and gesso, of the more elaborate and ornate development of which we may see examples in the ceilings of the Doria Palace at Genoa, for instance. Plaster enrichments and often elaborately modelled ceilings are associated with our own Tudor and Jacobean houses, and are sometimes the separate work of Italian artists and craftsmen as in the case of the famous ceiling at Blickling Hall. The Italian craftsman's skill in dealing with all kinds of plaster-work and the mystery of moulding and casting, remains pre-eminent, and perhaps the gesso-worker still survives in the adroit Italian artist who squeezes spirals and garlands, in a tinted gesso of plaster and sugar, upon our cakes. Sugar too was, I believe, an ancient ingredient in mixing gesso.

There are various kinds of gesso and recipes for the making of it, and it can be worked in different ways and on different scales and degrees of relief. For fine work on a small scale, such as might be used for caskets or small panels in cabinets, and the decoration of frames and furniture, gesso-duro is the best. It is a mixture of whitening, soaked first in cold water till quite soft, glue and gelatine, boiled linseed-oil and a little resin, mixed well together, warm of course, to the consistency of thick cream.

Supposing it is desired to work a design on a panel of wood, the panel had best receive a coat of shellac or varnish first. Then having traced or sketched direct in outline your design, lay on the paste with the point of a long-haired sable brush — the kind known as a "rigger" or fine water-color brush will answer. It should be held as perpendicularly to the panel as possible, so as to favor precision and clearness of touch, lightly dropping or floating the gesso on into the spaces of the design as its treatment may require, and adding more of the paste as greater relief is wanted.

Gesso-duro takes some days to harden, but dries, as its name implies, very hard. It can then be scraped down in parts if necessary, and worked on again or retouched to any extent; although I think, as a general rule, the peculiar quality given by the brush is perhaps best left unaltered, or at least only added to, and not taken away from by scraping down, yet a very fine finish of an ivory character could be obtained in this way, useful in some cases, as in making models for metal castings. The true character of gesso-work, however, seems best kept when the work is as direct and simple as possible.

There are various patents and materials in the market for working in gesso, but the best I have met with is called "Denoline." It consists of a fine powder sold in tins, which only requires to be mixed with cold water to convert it into a paste of any consistency required, regulated by the quantity of water used. Flour appears to be an ingredient, and wheat-flour was used, I believe, as well as sugar, by the old Italian gesso-workers. It is mixed as stifly as possible, about the consistency of modelling clay or wax, laid on and pressed and pulled into shape by the fingers, and finished by an ordinary modelling tool. "Denoline" dries slowly and can be retouched. It gets a little clinging and sticky in working, and no doubt, like all the different varieties of gesso, in common with every workable material under the sun, requires its own peculiar treatment.

Whiting and parchment-size is said to be a good form of gesso; I have not tried it. I have, however, used for both small and large scale work simply a mixture of fine mortar, plaster-of-Paris and diluted glue or size, which answers fairly well if done with certainty and directness, as this mixture sets much more quickly than the gesso-duro. It is, too, a little apt, if the suction of the ground be not thoroughly stopped, to crack off when dry.

"The Dance," one of a series of frieze panels, was worked with a brush and in the same mixture of plaster and glue, the larger masses being laid on with a spoon, the figures being modelled nude and the draperies and details being added with the brush afterwards. On this scale, however (the original is about three feet deep), plaster and glue cannot be relied on to hold without fibre, and for work of this scale, as also for bolder relief, it is advisable to use either tow or cotton-wool — I prefer the latter. You take the mixture of plaster-of-Paris and glue as before, but into it you dip small pieces of the cotton-wool, pulled out to keep the fibre from growing into hard knots, and, having thoroughly saturated them in the gesso, you proceed to lay them on your ground or panel, gradually building up the design and modelling as you go along. The panel may be of fibrous plaster, and suited for insertion in wall, frieze or ceiling, or fireplace. It is necessary, however, to wet the ground and shellac it to stop the suction before laying on the gesso. With the cotton-wool it will dry slowly enough to be modelled by the fingers or tools, and can be added to when dry, or finished and enriched with brush-work. It is very tough when dry, and the fibre of the cotton makes the gesso cling to the panel.

It might seem at first sight that such a material had no particular limitations or natural laws, which, in all forms of art, are so serviceable in evolving what we call *style*. Yet, elastic, as gesso-work appears to be, and possessing so considerable a range of effect and expression, experience soon teaches us that it has its own most fitting characteristics and tendencies in ornament arising directly out of the nature of the material and the tools. The artist, so far from desiring to disguise the real conditions of the work, would rather emphasize their peculiar characteristics. For instance, in laying-on and modelling any design in gesso with a brush, he will find the brush and the paste conspire together to favor the production of certain forms in ornament — delicate branch and leaf and scroll work, for instance, and dotted and linear borderings, lines of hair and drapery arranged in patterns. Such forms as these the brush charged with gesso almost naturally falls into, and, indeed, leaf-shapes may be considered almost as the reflection of the form of the brush itself.

The modelling of the more raised smooth parts is produced by gradually and lightly adding or rather super-imposing, while the gesso beneath is fluid, fresh gesso — like a kind of *pâte sur pâte* — which quickly amalgamates with the layer underneath. In modelling the limbs of figures it is best to emphasize the main muscular masses, isolating them somewhat from each other, and in building them up to the desired relief, to allow for the natural tendency of the paste to soften its own edges in running together. So that a limb would be built up somewhat in the way indicated in the drawing, by successive

layers of gesso in distinct masses floated over each other while moist, gradually allowing their edges to overlap and run together. Of course, the success of the result depends not only upon the nicety of touch, but also on the proper consistency of the gesso, which, if mixed too thin, would be likely to lose form and run out of bounds. Gesso, therefore, like the Valetudinarian's gruel in one of Miss Austen's novels, should be mixed "thin — but not *too* thin."

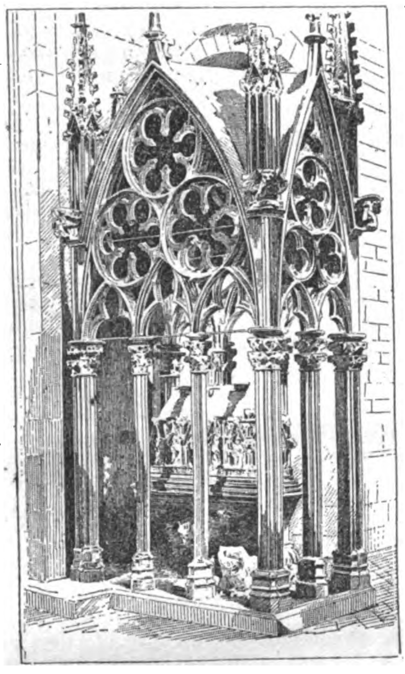
It is of little use giving exact quantities, since satisfactory working depends upon all sorts of conditions, constantly varying, such as the temperature, quality of the materials, nature of tools, etc., none of which behave exactly in the same way on all occasions, and must necessarily lead to different results in different hands.

It is only personal and constant experience of the subtle mechanical and material conditions which are inseparable parts of the production of all work of the nature of art, which can really determine their fitness to each individual worker, who must, sooner or later, if his work is alive, make certain variations to suit his own idiosyncrasies.

It is perfectly hopeless to attempt to pursue any form of art on purely mechanical principles and precepts. A few plain and practical directions — as to a traveller seeking his road in an unknown land — and the rest must be learned step by step in experience, and as much as can be gathered from opportunities of seeing the work actually grow under skilled hands, from which indeed everything learnable can be learned.

Even complete mastery over materials is, after all, not everything. In fact, from the artistic point-of-view, work only begins then, as the form of expression follows the power of speech. Design has much analogy to poetry; unless the motive is real and organic; unless the thought and the form have something distinctive and individual in them; unless the feeling is true, the work fails to interest us. Herein lies the whole question of artistic production. Yet that is worth learning which can be learned about any form of art, even if it only enables us to realize its true nature, and something of the laws of its expression; which knowledge, at least if it does not confer creative power, greatly increases the intelligent pleasure of appreciation. — *Walter Crane, in the Studio.*

THE AMPHITHEATRE AT ARLES.



A Tomb in the Monastery of the Holy Crosses, Taragona, Spain. From *La Construction Moderne.*

AN Englishman who wishes to see a Roman amphitheatre will of course prefer a journey to Rome rather than to Arles or Nîmes. The Colosseum is in length and breadth nearly one-half greater than the French examples, and it undoubtedly has more historic interest. It is well, however, to remember how vast was the difference between Rome and a sort of colonial capital. What seems surprising is that Arles, although it was the Gallic Rome, was able to obtain authority and aid to erect buildings so important as the amphitheatre and the theatre. Their size and character denote the value which statesmen ascribed to spectacles as an aid to government by supplying one of the necessities of life, *panem et Circenses*, for Romans. The belief in their efficacy still prevails in France. It is not only in Arles and Nîmes that the remains of amphitheatres are found. They exist also in Bordeaux, Saintes, Poitiers, Senlis, Béziers and Fréjus. Nor was the predecessor of Paris without its arena.

At Arles the site was selected with judgment. Although the building has been freed from the houses which, like parasites, were attached to it (they were made up of its materials), yet as it is surrounded by streets, a visitor does not realize that the ground on which it stands is the highest in the neighborhood. In fact, the slope of the site made it necessary to employ an immense mass of masonry in the substructure.

We suppose it can never be determined when the amphitheatre was constructed. It is probably as well the date should be unknown, for if a record relating to the work were discovered, there would be an end to the controversy among the archæologists of the South of France about the relative ages of the amphitheatres of Arles and Nîmes. Priority is claimed for Arles on account of a supposed refinement in the detail, which is said to indicate a period when Greek influence had not vanished. The less complete hydraulic arrangements are accepted as further proofs of age. On the other side, it is contended that the superiority of the treatment which is visible in the arching, as in other parts of Arles, is evidence that the builders were novices when they erected the amphitheatre at Nîmes, and accordingly they were able to give the benefit of their experience to the work at Arles. In both places, any pride there may be in the quality of the masonry would be sacrificed if by doing so some assurance of greater age could be given. The amphitheatre of Arles may date from the beginning of the second century, but there is no historic evidence of its existence prior to the fourth century, for about A. D. 335 it is recorded that spectacles were held in it. The later emperors were disposed to keep the people in good humor, and during their brief reigns the arena of Arles was probably not allowed to be unoccupied. The early Frankish kings followed their example, but it is to be hoped without sacrificing the lives of human beings. The remembrance of those sacrifices was enough to compel Christians to have an enduring aversion towards the theatres in which they were enacted. The amphitheatre of Arles was doomed to ruin. The quantity and strength of the masonry were not easily overcome. Before the building was demolished, Arles was threatened with an invasion of Saracens, and the people were glad to utilize the ruins and convert them into a citadel. When the danger was at an end the amphitheatre was again treated as a quarry. Fortunately Arles was a place of slow growth, and the stones were not required except for ordinary buildings. There were no palaces like the Palazzo di Venezia, the Palazzo Farnese, the Palazzo Barberini and the Cancellaria Vecchia, which were built with the stones taken out of the great Roman amphitheatre. During centuries the ruins were pillaged for mean hovels or neglected until the Renaissance gave interest to all relics of Roman greatness. The place was visited by François I, who lamented the degradation he witnessed. Henri IV took a more practical view, for he ordered some of the buildings, that were erected in the arena, to be removed. At his death there was only a partial clearance, then followed a fresh period of neglect. In the beginning of the present century, when Frenchmen were esteeming themselves as the heirs of the ancient Romans, interest was once more renewed in the amphitheatre, and the colossal work of clearing the ruins from rubbish was commenced. But the squatters were less easily removed. There were over two hundred houses within the amphitheatre, and the occupants could not be evicted without compensation. It was considered to be a victory that at the beginning of 1830 one hundred and eighty were already demolished, at an outlay of 3,000*l.* The remaining thirty-one houses cost no less than 24,000*l.* Altogether more than 7,000*l.* had been expended before M. Questel was asked to report on the works that were requisite for the conservation of the amphitheatre.

It is evident that the elliptical plan of the Colosseum in Rome was taken as a model in the provinces of the empire, but the ratios of the axes differ slightly. In Rome the major axis of the ellipse, measured to the exterior, is 616 feet, and the minor is 611 feet, or 1 : 1.26; 1 : 1.20. In Arles the axes are 446 feet and 353 feet, or 1 : 1.26; while in Nîmes the axes are 433 feet and 332 feet, or 1 : 1.30. The arenas of Arles and Nîmes are almost identical in size. The former measures 227 feet by 130 feet; the later, 227 feet by 127 feet — a correspondence that cannot be accidental. As the ratio of the inner ellipse was about 1 : 1.8, the occupants of the lower seats possessed not only a closer view of the scenes in the arena, but they were able to see easily across "the house," and to recognize acquaintances in opposite tiers. Owing to the corridors being of uniform width the ratios between the axes were altered, and accordingly the upper tiers of seats were not only farther from the arena than those below, which was unavoidable, but as the ellipse gradually approached the circle (since the minor axis was increased in length at a rate that was impossible with the major axis) the occupants, in proportion to their inferiority, were kept more apart. The elliptical plan was probably adopted in order to suit the convenience of the most important people in a Roman city. If the seats were arranged on a circular plan (assuming the length of the arena to be the same) there would be fewer chances for the occupants of the *podium*, or row of boxes, to exercise themselves in the language of the eyes.

There were discoveries at Arles which enable us to realize some of the arrangements of the podium. That part of the amphitheatre was faced with marble, and was divided so as to form a series of boxes, which were assigned to officials, corporations, and other people of importance. At Arles the divisions did not rise from the ground, but rested on a sort of cornice which was carried by walls. It is supposed that a sort of wooden gallery was built in front of the podium, which could be used as a refuge by the *bestiaires* if they were pursued too closely by the wild animals. In the modern circus the performers, when they wish to suggest they are in danger from a trained mule or quadruped, vault among the audience, but Roman senators and commanders would not be so tolerant of the presence of men who fled instead of combating. The gallery could also be safely used by the grandees when they goaded the animals on leaving the cages. That combats with lions, tigers and panthers were more common in the amphitheatre of Arles than at Nîmes is evident from the height of the podium we have described, which no wild animal could bound over, as well as from the remains of the animals which have been found in the subterranean chambers. Two inscriptions are also to be seen in the Musée of Arles, which relate to

contests of gladiators and *bestiaires* that were provided at the cost of two of the grandees of the colony.

The exterior of the amphitheatre of Arles presents two stories or series of arcades, the lower being Roman Doric and the upper Corinthian. It is assumed there was also a very low attic on which the blocks used for supporting the *velarium* were built, but there is no trace of the arrangement, Arles in that respect being less fortunate than Nimes. It is still possible to appreciate the arrangement of the plan, which was so simple that few of the 25,000 spectators were likely to be puzzled in reaching their prescribed places. The principal entrances were at the ends of the major axis, and from them a gallery led direct to the podium, which contained four rows of benches. There were three other divisions, each having eleven rows of benches, which communicated with corridors and staircases leading to the external arcades. The subterranean part had also its passages to and from the outside world. There is some cylindrical vaulting in one of the galleries, but on the whole the construction imposed no great difficulties on the masons. The massiveness of so many of the stones is characteristic.

It is remarkable that the theatre of Arles, of which only enough remains to suggest the splendor of the building, is supposed to owe its ruin to the portability of the stones which were employed in it. Built of stones as large as those seen in the theatre at Orange, it was likely to have as well withstood the wear and tear of ages. We have cause, therefore, to be grateful to the builders of the amphitheatre who insisted on using such a quantity of large stones in the amphitheatre, although it was necessary to convey them from a quarry that by the route taken was twenty miles distant. — *The Architect.*

THE ILLUSTRATIONS

[*Contributors are requested to send with their drawings, plans and a full and adequate description of the buildings, including a statement of cost.*]

UNITARIAN CHURCH, WESTON, MASS. MESSRS. PEABODY & STEARNS, ARCHITECTS, BOSTON, MASS.

[**Gelatine Print issued with the International and Imperial Editions only.**]

WEST WASHINGTON MARKET, NEW YORK, N. Y. MR. DOUGLAS SMYTH, ARCHITECT.

HOUSE FOR H. SCHREIBER, ESQ., EAST JAFFREY, N. H. MR. PATRICK A. TRACY, ARCHITECT, BOSTON, MASS.

DESIGN FOR A CITY SAVINGS BANK. SUBMITTED IN A COMPETITION OF THE DENVER ARCHITECTURAL SKETCH-CLUB.

Y. M. C. A. BUILDING, MIDDLETOWN, CONN. MESSRS. COOK, HAPGOOD & CO., HARTFORD, CONN.

A CITY HOUSE. MR. R. H. ROBERTSON, ARCHITECT, NEW YORK, N. Y.

BELKNAP COUNTY COURT-HOUSE, LACONIA, N. H. MR. WILLIAM M. BUTTERFIELD, ARCHITECT, MANCHESTER, N. H.

THE building is about 60 x 80 feet two stories in height, the first floor being occupied by the county officers and grand-jury room. Fireproof vaults and a toilet-room are provided for each office. The court-room is located on the second floor, also with accommodations for the judges, jury and attorneys. The basement is constructed with coursed ashlar of pink granite up to the water-table, above which the walls are of dark red pressed bricks with red sandstone trimmings. The interior is finished with northern ash, and the structure will cost about $26,000.

[Additional Illustrations in the International Edition.]

STONE MANTELPIECE FROM THE CHÂTEAU ARNAY-LE-DUC.

[Copper-plate Photogravure.]

THIS chimneypiece, a monumental work of the first rank, in the style of the French Renaissance, comes from the Château of Arnay-le-Duc, in Burgundy. The chimney-breast, greatly projecting, is supported by two groups of pilasters, whose faces are carved and decorated with bouquets of foliage and trophies. The capitals are ornamented with *putti*, carved out in the form of volutes, masks and cherubim. The base of the mantel consists of a large frieze between two groups of mouldings decorated with leaf-work, cherubim and festoons. Upon the frieze alternate genii, supporting escutcheons without blasonry, of Italian form, and candelabra supported by *rinceaux*. Above rises the main portion of the design, which is divided into four parts by five columns resting upon the rather high bases, and supporting an entablature of antique style. Upon the podium, upon which the columns rest, are carved trophies of arms and circular medallions supported by infant figures. Upon these medallions is engraved the monogram "E. M.," and this same cipher is repeated on the bases of the columns, and upon the pedestal of these columns may be read the following inscription:

DE GRAN BIEN MERITE — ET POINCT NE DEFAVLT — IL N'EST QV'ADRESSE — QVANT TOVT PREVAVLT.

In the intercolumniations are carved four great circular medallions, copied after Italian placques, representing: Orpheus reclaiming Eurydice from Pluto and Proserpine; Orpheus playing the lyre, and surrounded by mænads and animals; four naked men in combat; a man seated on a throne before whom a personage presents a dead man, whom he carries on his back, while at his feet is stretched a fourth nude figure with his hands fast under a large stone. The height of the whole composition is 4.10 metres, its breadth 4.80 metres. This chimneypiece, which must have been carved about 1525 to 1530, evidently belongs to the earliest Renaissance. It is interesting from more than one point-of-view, and certain of its mouldings still present Gothic profiles, which, nevertheless, harmonize well with the pilasters carved in the Italian style. Nevertheless, one feels that the artist had some difficulty in habituating himself to the new style, and his want of practice is betrayed in the exaggerated entasis of the columns, which divide the mantelpiece into sections. However all this may be it is altogether a work of the first rank, and gives to the whole composition a monumental air. This subject is only one of several mantelpieces which belonged to the famous Spitzer collection.

UNITARIAN CHURCH: REAR VIEW, WESTON, MASS. MESSRS. PEABODY & STEARNS, ARCHITECTS, BOSTON, MASS.

[Gelatine Print.]

CHRIST CHURCH, FENTON, ENG. MR. CHARLES LYNAM, F. S. A., STOKE-UPON-TRENT, ARCHITECT.

THE church consists of a nave of six bays, with clerestory and aisles, and north and south porches; a chancel, with a chapel on the south side, and a clergy vestry on the north; also a north transept, containing a choir vestry and an organ-chamber. The foundations for a western tower have also been put in. The floor-space of the church will accommodate about 1,000 worshippers. The chancel is enclosed by open oak screens, and fitted with oak stalls, whilst benches are provided for the church generally. The style is English Decorated, and was dictated by the requirement of the committee that certain prominent features of the former church should be re-used. In the gable of the north porch a niche has been provided in which a figure of "Our Lord in Glory" has been placed. The chancel is spacious, and the altar well raised. The side chapel has a separate altar, and is fitted with chairs for the daily services. Besides the north and south porches there are two exit doorways at the east end of the aisles. The heating vault is beneath the clergy vestry, and where the hot-water pipes are laid below the floor, openings are formed in the passages above the pipes of pierced terra-cotta. The chancel is lined with ashlar stone; all the other facings are of bricks both inside and outside, and in each case they are varied in colors not in patterns, but promiscuously, as furnished by the peculiarities of the bricks themselves. The roofs are open-timbered, unvarnished, with an external covering of lead to the aisles and slates elsewhere. The floors are laid with deal blocks and tiles in the passages and sanctuaries. The new church extends beyond the boundaries of the former one into the church-yard, and consequently the disturbance of former interments was necessary, and a church-yard cross of considerable dimensions has been erected commemorative of this unavoidable work. The total cost of the buildings and fittings was something under 7,000*l.*

NEW PREMISES, SHOE LANE, LONDON, E. C., ENG. MR. HERBERT KNIGHT, ALDERMANBURY, LONDON, E. C., ENG., ARCHITECT.

THIS building, comprising and area of some 3,000 feet superficial, is being built in a very substantial manner for a printing warehouse. The fronts are of Portland stone, the whole of the front portions of basement being in white glazed bricks.

HOUSE, BROADSTAIRS, ENG. MR. WILLIAM A. BURR, ARCHITECT.

THIS house will shortly be erected for Mr. King Cochram on a piece of land situate at Broadstairs, which adjoins the Coastguards' Station and Bleak House, the house in which Charles Dickens wrote and took the name for his novel. The window of his favorite room overlooks the grounds, the rustic pier (mentioned in his book), the bay, etc. The front, shown in the illustration, will overlook the sea. The lower portion of the house will be built with bright red bricks, whilst all that portion above the level of the window sills will be in depeter work, with the gables half-timbered, except the bay window and the quoins, which will also be in red bricks. The roofs will be covered with Broseley tiles.

NOTES & CLIPPINGS

STRENGTH OF BRICK MASONRY.—The strength of brick masonry has been investigated in the laboratory of the University of Illinois by M. A. Earl and A. B. Loomis. They constructed a number of brick beams and piers, which were broken under various conditions and in various ways, with results that showed roughly that the modulus of rupture of regular brick-masonry is about twice the tensile strength of the mortar used, although it may be three times as much. With masonry less than four weeks old the results were not so good, the modulus being about the same as the strength of the mortar.—*The Engineering Record.*

PUBLIC BATHS FOR CHICAGO.—An agitation for public baths in Chicago encounters, by the admission of one of the local papers, a lack of interest, but the Common Council having made an appropriation of $12,000 for the purpose, one house will probably be built this summer. It is proposed to make it self-sustaining. A charge of five or ten cents will be asked of each bather in order to defray the cost of maintenance. A site on the west side of the city would naturally be selected for the building. A beginning having been made, a bath-house would next be provided for the south-siders, and it is suggested that a natatorium on the Midway Plaisance at the Fair grounds might be secured. Mayor Harrison thinks well of this plan. The matter is only interesting as showing how far behind the age Chicago is in providing for its people a convenience necessary to their health and comfort, which no large city in the East or in Europe with an extensive water front is without.—*New York Evening Post.*

TAR AND ASPHALT FOR TANKS.—A mixture of coal tar and Californian rock asphaltum has been successfully employed by Mr. R. C. Gemmell for lining a reservoir for the city water-works of La Grande, Oregon. The reservoir is of oval shape, part in excavation in heavy clayey soil and part in embankment made from the excavated material, with inner slopes of three to one. The depth of water is ten feet; the area of surface, 20,880 square feet; and the capacity, 1,000,000 gallons. The lining consists of one layer of brick on edge, covered by three-eighths inch of the bitumen mixture. After the earth had been excavated and the embankment made, the whole surface was thoroughly rammed with iron punners weighing twenty-five pounds each. The bricks were then laid, and rammed solidly into place; the joints and cracks being brushed full of clean sand. Coal tar was used as a flux for the asphalt, in the proportion of from ten to twelve per cent by weight of the latter; the mixture being "cooked" by boiling for five or six hours with constant stirring. A large bucketful at a time was taken out of the kettle by two men, and spread in a thin layer over the bricks by means of shovel and broom. It required two layers put on in this way to make the requisite thickness of three-eighths inch. As much sand as would adhere to it was sprinkled over the last layer while hot. The reservoir has never leaked. It is suggested that this way of rendering tanks water-tight at small expense might be extensively used for sewage-works, etc.—*Scientific American.*

FATAL ACCIDENT IN THE CHANNEL TUNNEL.—An accident, resulting in the death of two men and the narrow escape of five others, occurred recently at the Channel Tunnel works. Since the boring of the Channel Tunnel was stopped by Mr. Chamberlain, when President of the Board of Trade, the tunnel and its machinery, timber supports, etc., have been maintained in precisely the same condition as the day the work was stopped. The excavation is as nearly as possible one mile and a quarter in length. It is periodically visited for the purpose of keeping everything in repair. A gang of five or six men descended the shaft for the purpose of carrying out some repairs upon which they had been engaged. An hour before the air-machine had been at work pumping air into the farther end of the heading to drive out any foul air. The men had not been down very long before cries for help were heard from the bottom of the shaft. A relief-party quickly descended, when it was found that all of the men were more or less suffering from suffocation, some of them being quite exhausted. They were sent to the surface as speedily as possible, some of them being apparently dead. It was found that in the heading the fumes of carbonic-acid gas were so overpowering that it was not possible to penetrate very far. The relief-party also suffered considerably, and some of them in rescuing their comrades nearly became victims themselves. It was found that two men named Henry Fisher and Charles Horton were missing. Their bodies were subsequently recovered from the heading, bearing painful evidence of the shocking death they had met with. Both men leave wives and families. Fisher had five children. According to the statements of the survivors, the men had advanced some distance into the tunnel when they suddenly became sensible of a suffocating feeling. Those in front called out, and then all attempted to return to the bottom of the shaft as quickly as possible. The fumes followed them so quickly that they were almost overpowered. As far as can be learned, it appears that Fisher, when running back, knocked off his hat, and, it is supposed, tried to pick it up. In stooping, it is believed he inhaled the carbonic-acid gas, which would be more dense on the ground, and then became overpowered. Horton either tried to assist his comrade or fell over his body. Some of the others tried to drag the men away, and nearly lost their own lives in the attempt. The theory of the disaster is that some of the old timber on the heading which was being repaired on Saturday became ignited and smouldered, and that when the air was pumped into the far end of the heading it gradually drove the vitiated air toward the outlet. The accident was not known in Dover till late in the day, when the bodies of the two men, Horton and Fisher, were removed to the mortuary. Six men were suffering from symptoms of asphyxiation, and the greatest difficulty was found in restoring four of them.—*London Daily News.*

THE WATER-SUPPLY OF HAMBURG.—The terrible cholera epidemic in Hamburg last year brought the unsatisfactory water-supply of the town into prominence, and the corporation at once set to work to improve matters. Hamburg had previously taken the water from the Elbe almost without any filtration, and it was decided to at once adopt an extensive system of sand filters. The water used to be pumped from the river, but now it runs through a canal to a reservoir, with a pumping-station. Here it passes a series of filters which retain the coarser kind of impurities. The pumping-station has five steam-engines with double pumps, of which each single pump has a capacity of 2,500 cubic metres (88,291 cubic feet) of water per hour; the water then enters a series of reservoirs, of which each can hold 120,000 cubic metres (26 1-2 million gallons). From there a canal leads to the sand filters at Kaltenhof, which consist of several layers of cobbles and gravel, covered with a layer of sand 3 feet in thickness. Of these filters five are now completed; each has an area of 7,500 square metres, and with a filtering speed of 2 cubic metres (441 gallons) per square metre (1.07 square feet) for each twenty-four hours, gives 15,000 cubic metres of water, which, taking the aggregate of the five filters, now ready, affords 120 litres per individual, or about half the consumption of the town. The filters will, therefore, be sufficient for the whole requirements of the town. With regard to the effect of the frost upon the filtering, no fears are entertained. The water will always be held about 3 feet over the filters. The strongest frost which has hitherto been experienced in Hamburg has never produced ice of more than some 15 inches in thickness. The whole installation comprises eighteen filters, of which two will always be empty for cleaning purposes. In order to receive the accumulated water during the night, large covered reservoirs have been built at Rothenburgsort, where the filtered water is completely protected. The energy with which this large undertaking has been pushed ahead is a credit both to the town of Hamburg and the chief engineer, Herr Meyer.—*Engineering.*

BROAD TIRES *vs.* NARROW TIRES.—In order to arrive at a satisfactory solution of the effect of wide-tire or narrow-tire wagons on roads a series of exhaustive tests have been made by the aid of a dynamometer recently, and the results, as described in a California paper, show that broad tires, of any width that would be really practical, would not make good roads, simply having less tendency to cut up poor roads than does the narrow tire. It is urged that the harm to wagon roads commonly occurs when the surface is saturated with rain and the roadbed is soft and yielding, so that at such times loaded vehicles having wheels with narrow tires cut out ruts more or less deep, according to the length of the wet spell and the amount of use to which the roadway is thus subjected; when, however, the roadbed is solid and care is taken to promptly fill up inequalities created by the wear and tear of the surface, under these circumstances narrow tires, to all intents and purposes, are no disadvantage to the roadbed, while they are unquestionably of greater advantage to the vehicle. Narrow tires tend to lighten draft in drawing loads over smooth roads and over those that are soft; but over surfaces that are sandy or yielding in their nature the wide-tire wagons give the best result, and are accordingly better for general field use. Again, a consideration to be noted is that the supply of material for felloes, in the case of wide-tire wagons, is less abundant than that which is suitable for narrow tires; wide-tired wagons being, on this account, more expensive than those having tires of the usual description, a difference liable to be still further increased.—*New York Sun.*

NICKEL IN THE UNITED STATES.—At a recent meeting of the Engineers' Society of Western Pennsylvania, a paper was read and a discussion had on the subject of nickel, from which it appears that the nickel deposits at various places in the United States which may be valuable are in Oregon, Nevada and North Carolina. A trial of the North Carolina ore is reported as showing an average of about two per cent of nickel although some samples were obtained running up to ten per cent; the Nevada ores are abundant in quantity and comparatively rich, but they are arsenides of nickel and difficult to refine; the Oregon ores are of the silicate class, and have not been developed in commercial quantities. In regard to the welding of nickel and steel, an examination of rolled sheets thus treated is said to reveal no evidence at the edges as to where the nickel ends and the steel begins, though of course the outside is mostly nickel and the inside steel—the nickel is welded to both sides of the sheet of steel, making a non-oxidizable article having the stiffness of ordinary steel, and convenient for various uses. Metallurgists are of the opinion that for a variety of purposes, a steel with a high percentage of nickel may prove of considerable practical value, and the progress of experiment in this direction will be watched with much interest.—*New York Sun.*

RUSSIA'S COMPENSATION TO FREDERIC REMINGTON.—The munificent sum of $21.71 has been sent by the Russian Government to Mr. Frederic Remington as an indemnity for the troubles he underwent in the Czar's dominions last summer. Mr. Remington bore the special passport of the United States, and his trip to Russia was undertaken simply for the sake of making sketches connected with his private work, and was devoid of all political significance. He was not permitted to make notes, the canoe he took with him from this country to St. Petersburg was detained and damaged, and he was not allowed once to launch it, and his summer was practically wasted. Hence the generous compensation.—*Harper's Bazar.*

THE big wheel-pit for the Niagara Falls Power Company is nearly completed. This pit is 200 feet deep, 100 feet long and 20 feet wide, and will be fitted with the appliances for four 5,000 horse-power wheels. This is the first of eight pits of equal size included in the plans. A smaller wheel-pit for the Niagara Falls Paper Company was finished last week.—*Engineering News.*

S. J. PARKHILL & Co., Printers, Boston, U. S. A.

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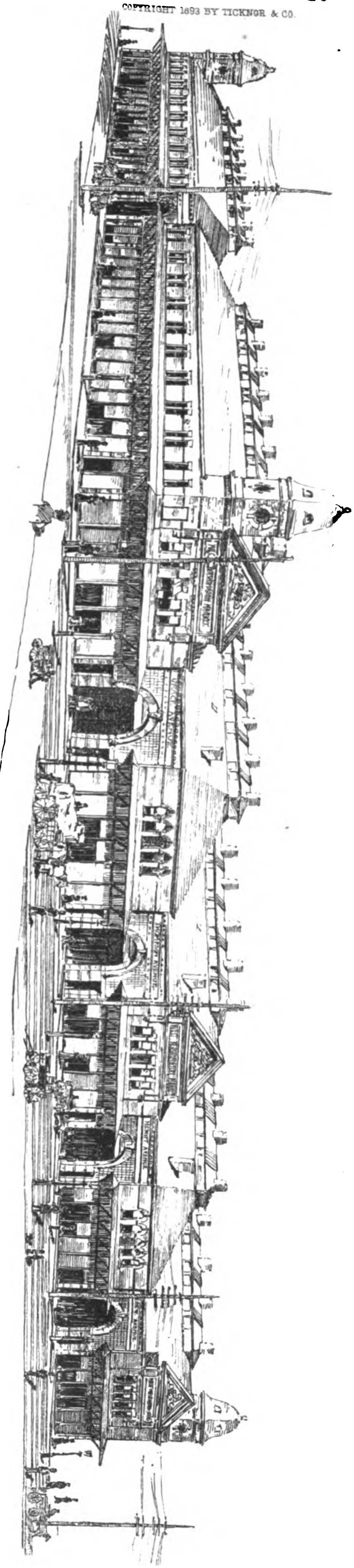

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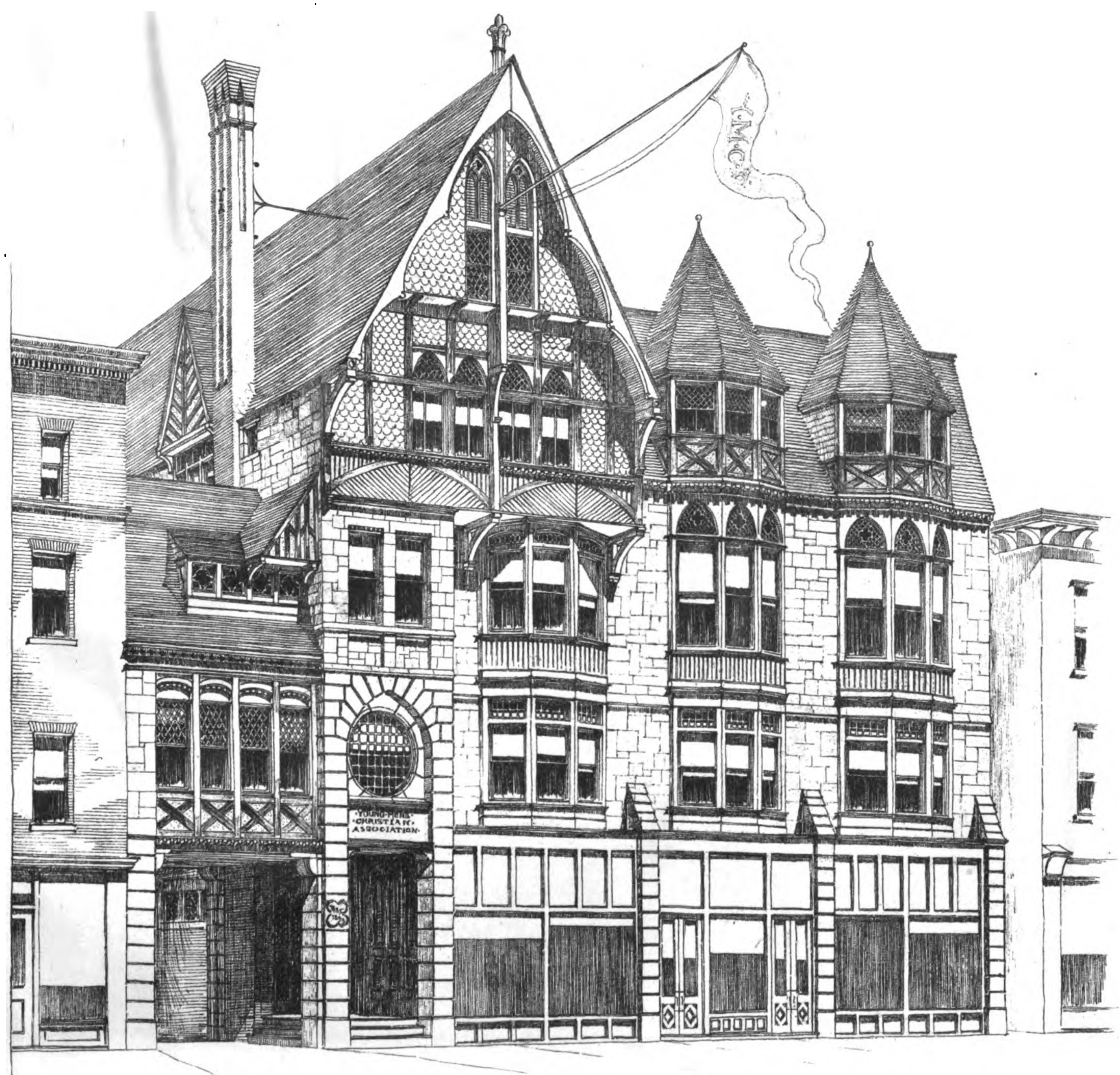
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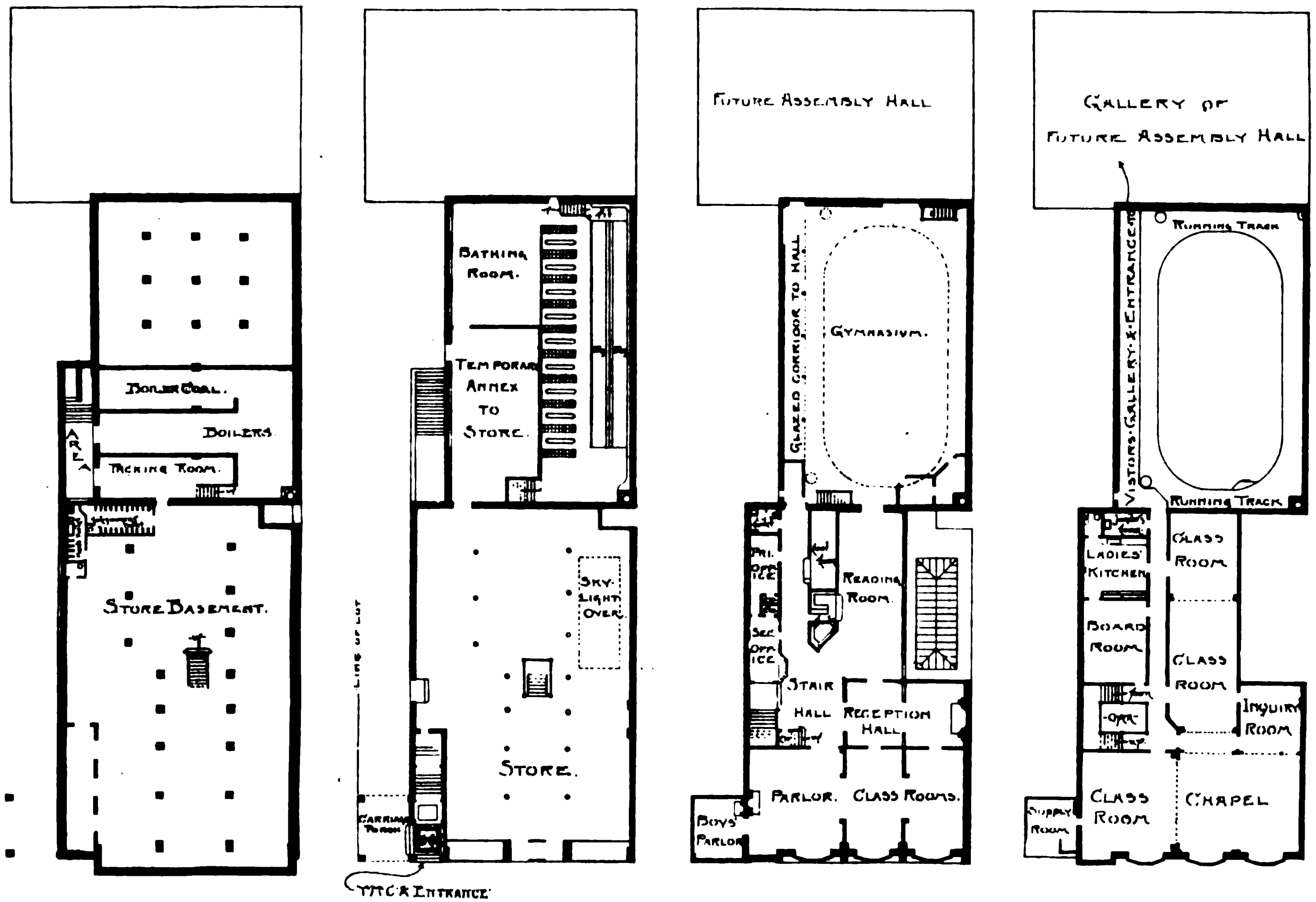

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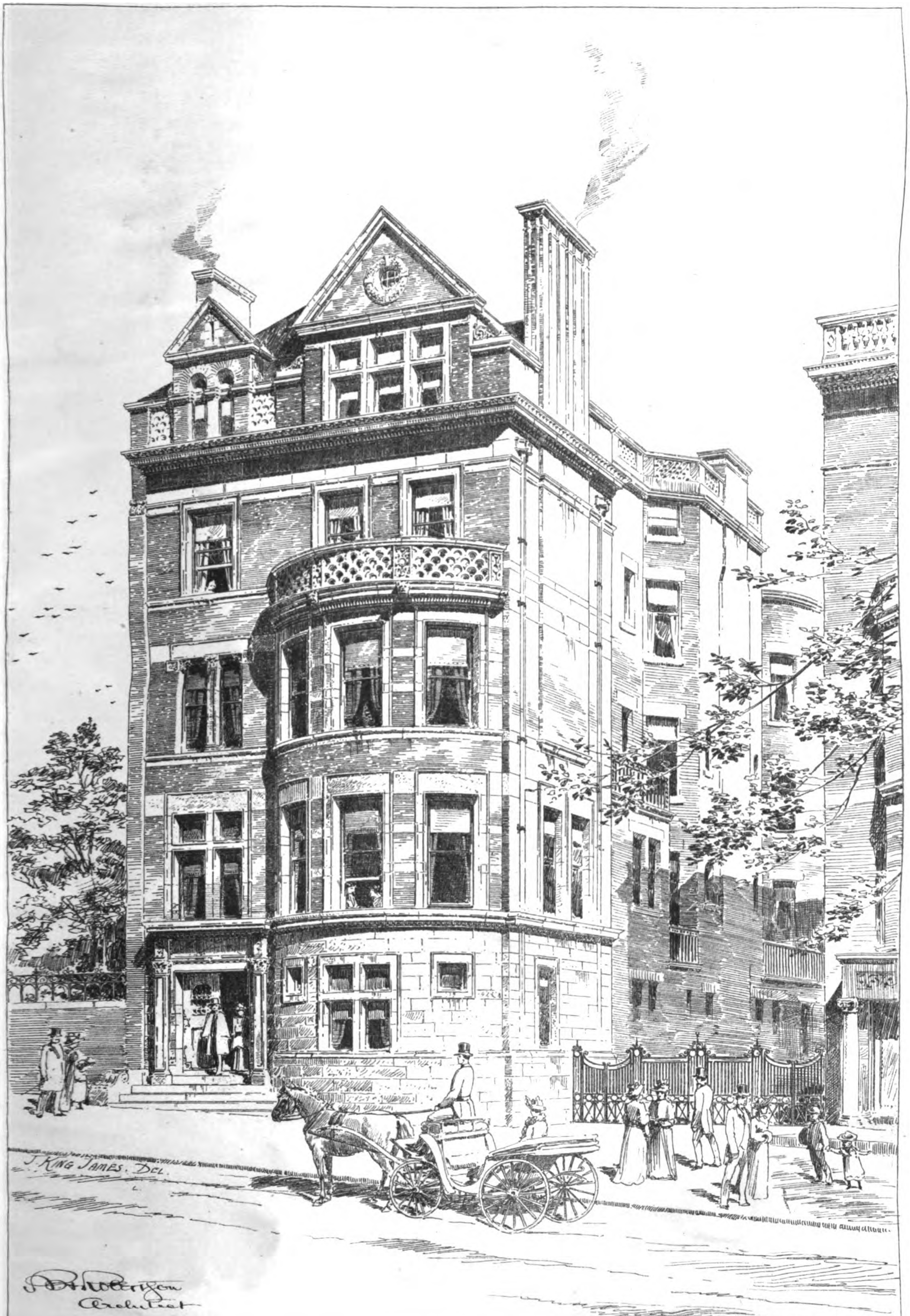

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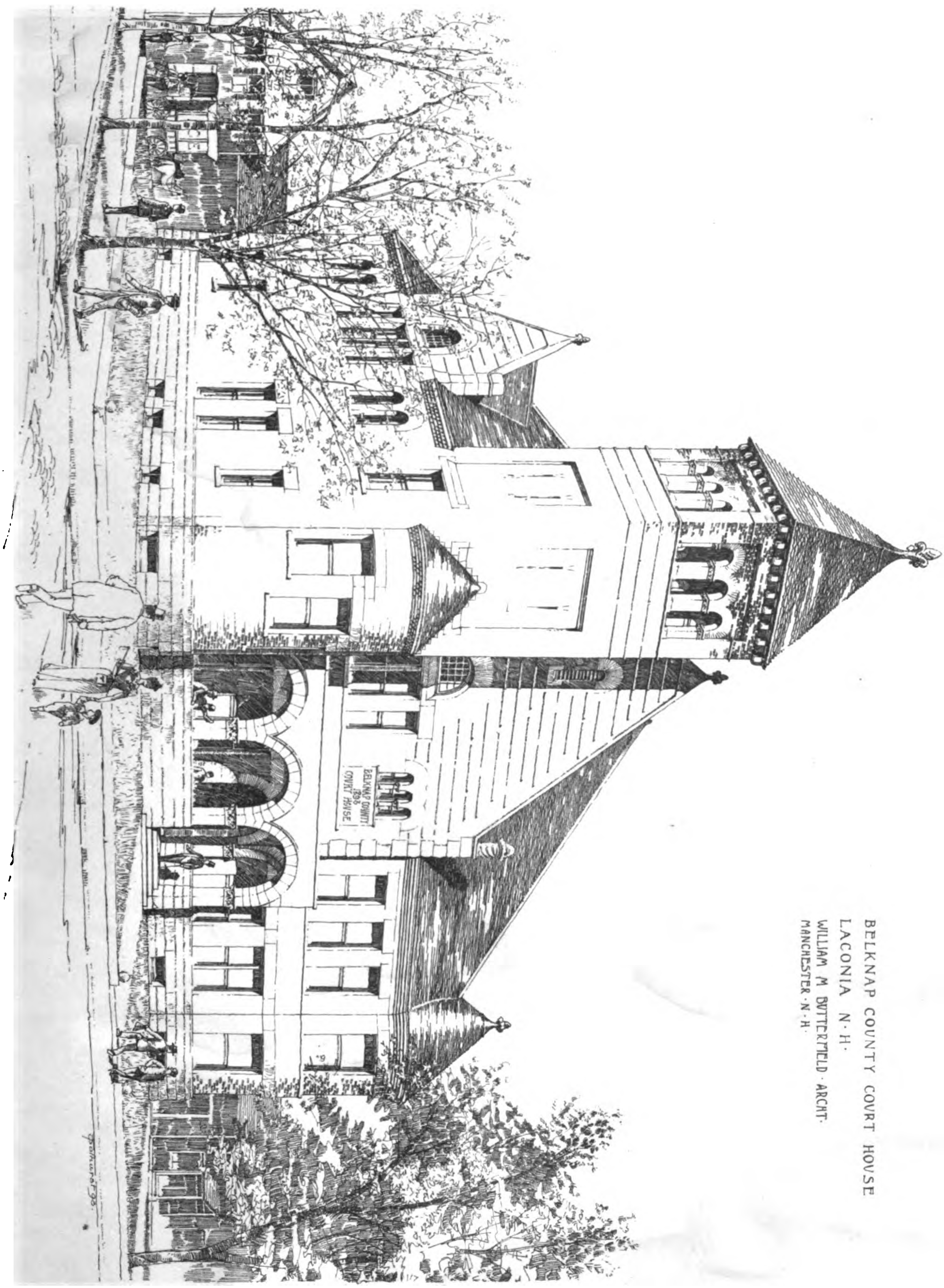

BELKNAP COUNTY COURT HOUSE
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THE AMERICAN ARCHITECT AND BUILDING NEWS.

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JULY 15, 1893.

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A STORY is going about the newspapers, to the effect that Secretary Carlisle, on being asked when he intended to give effect to the new law, which authorizes him to employ private architects to design and supervise the construction of public buildings, replied that he had no intention of "squandering" the public money in hiring architects, and that he should, for the present, at least, adhere to the present system, from motives of economy. Whether the story is true or not, we will not undertake to say, but if it is, the Secretary must have a queer notion of economy. It was proved beyond doubt, in the recent investigation into the usefulness of the Supervising Architect's office, that the public paid about twice as much for the official designing and supervision of its buildings as it would have to pay a private architect for the same work, and that the buildings themselves, under the official system, cost about twice as much as private owners had to pay for similar buildings erected under the care of private architects; while the quality of the results secured by the "plan factory" system is well illustrated in the Chicago Post-office, which, after years of warning from the technical journals, has just been emphatically denounced by the Building Commissioners of Chicago as being in "an unsafe and dangerous condition," while to the reporters the Commissioner adds that "when the building falls," which it must do sooner or later, the General Government will be "criminally responsible" for the consequences to the hundreds of persons employed there. Whether the Commissioner proposes death by hanging, or a term of imprisonment, as the proper penalty to be applied to the General Government by a Criminal Court does not appear, but his expressions certainly indicate the sentiments of a good many experts in regard to the way in which some, at least, of the Government building-work has been attended to in times past. Meanwhile, an order has been issued, assigning certain engineer officers of the Army to the duty of inspecting public buildings of doubtful solidity, and, while this task could hardly be entrusted to better hands, we cannot help wishing that a balance-sheet could be prepared for the public edification, showing the economy of paying two dollars for designing, supervising and building a structure for the Government for every dollar that would be paid for the same work under the care of private architects, and, shortly after the completion of the building, pulling it down in anticipation of its spontaneous fall, and beginning the whole operation over again, with a fresh supply of funds.

A VERY curious and instructive experiment was carried out in Berlin the other day. An old building, which was to be removed to make way for new constructions, was secured, and a competitive test of fire-resisting materials instituted. Of course, it was impracticable to rebuild the house with real fireproof construction, but in Germany, as here, there are many manufacturers of materials for building fireproof partitions, or for protecting ordinary wooden construction against fire, and the architects and fire-engineers who instituted the test thought, with justice, that a thorough trial of these was of great importance, and that the opportunity of making it should not be neglected. In order to make the test conform as closely as possible to the conditions likely to be met with in practice, the different rooms were fitted up in various ways. Several were left as simple living-rooms, with such furniture as would be found in ordinary dwellings; one was fitted up as a furniture-manufactory, another as a drug-store, a third as a moulding-mill, a fourth as a storage-room for furniture, and two others as petroleum stores. The rooms were then assigned to the manufacturers who wished to compete, for them to protect according to their systems. In order to make the test as comprehensive as possible, however, the manufacturers were required to protect various pieces of iron-work by their own systems, and in some cases, where there was a doubt as to the capacity of the fireproofing material for enduring a sudden shock, heavy weights of iron were supported above them by light wooden frames, so that, on the burning of the frames, the weights would fall. Arrangements were made for extinguishing the fires both by hydrant streams and hose from a steam fire-engine, so as to test the resistance of the various materials to sudden cooling and to the violent impact of the engine stream, and, with the scientific thoroughness characteristic of the Germans, a set of pieces of different substances, made for the purpose and fusible at known temperatures, was placed in each room, so that the temperature produced by the fire would be registered.

A JURY of experts was appointed, and a large company of architects, fire-engineers, builders and scientific men was invited to witness the test. As this lasted several days, the rooms being separately set afire and extinguished, a restaurant in the neighborhood was engaged for the use of the guests, and there the manufacturers displayed drawings and models of their systems, while the preliminary discourse, by the veteran Herr Stude, the Director of the Berlin fire-service, was given, and the decisions of the jury announced, in the same place. According to the admirable description in the *Deutsche Bauzeitung*, from which we can, unfortunately, only borrow the most important particulars, it appears that the fire was first set in an upper chamber, which had been treated by an exhibitor from Breslau, a carpenter named Schubert. The novel portion of Herr Schubert's construction consisted in plastering on a network of square wooden rods, interwoven with wire. Plastering in Germany is usually done on reeds, instead of wooden lath, so that the Schubert construction was particularly interesting to the company, and, as his square laths were set with the edge toward the front, he secured a good key, besides protecting a larger part of the surface of the laths than is usual with wooden lathing. In the room tested, this sort of lathing was applied in various ways. The old walls, and the underside of the rafters, were covered with it, and plastered; a partition was made of two thicknesses of it, the laths of the two thicknesses crossing, and plastered on both sides; another partition was made of two thicknesses, but on studding, and the space between filled with slag, and a floor was laid with it and covered with cement, the ceiling under being lathed in the same way, and plastered, while a deafening of earth, in the ordinary German manner, was put between the beams. After the fire was extinguished, it was found that, although the temperature, as shown by the fusible standards, had exceeded one thousand degrees Centigrade, which is about the melting-point of cast-iron, the plastering on the Schubert laths showed only unimportant cracks. Where the laths were exposed in these places, they were charred, but the mortar at the back of the charred laths was uninjured. The floor of cement on laths was in good condition, and watertight. Besides this construction, however, Herr Schubert showed other devices, of a less simple and sensible sort. Among these was

a door, consisting of a single sheet of magnesite, applied on a double layer of jute fabric. This door, although it was very small, being only two feet wide, and less than six feet high, had warped under the heat, so as to allow the fire to pass through the opening into the next room, and patches of the magnesite had scaled off. He had also treated the wooden stairs, by soaking them for two weeks with brine, and then covering them with asbestos linoleum, a process which the *Deutsche Bauzeitung* calls an "excuse for protection, very disproportionate to the object sought," while it describes the appearance of the staircase as "anything but pleasing."

THE next exhibitor showed a material which reminds one strongly of the so-called "fireproof" materials to which the attention of architects here is frequently called. This substance was a linen canvas, made "fireproof" by impregnation with some mineral salt, and waterproof by painting, and represented to be desirable for protecting woodwork, covering roofs and laying over floors. According to the report of the jury, who watched its behavior, this valuable material "immediately blazed up" as soon as it was touched by the fire, and, so far as they could see, it presented "no noticeable resistance to fire," although they thought it possible that, being freshly painted, it might not have done so well in this instance as it would under more favorable circumstances. Next to the linen-canvas fireproofing came a system of covering with plates of cement-concrete, which was applied to walls, ceilings and floors in one of the rooms, as well as to iron beams; while a partition was built-up through the middle of the house, consisting of two thicknesses of it, with an air-space between. Although the heat in the room exceeded 1,000 degrees, the cement plates resisted admirably. Here and there the cement was slightly cracked, but the wood and iron under it was perfectly protected, the iron beams showing no loss of strength in testing subsequently. The report of the jury pronounced this system, known in Germany as "Boklen's construction," to be "thoroughly fireproof," so far as the results of the test showed. This seems to have ended the first day's testing. The results of the succeeding trials we may, perhaps, be able to give later.

WE were asked some time ago for information about the xylolith, or wood-stone, which is coming into such extensive use in Germany. We were unable at that time to say much more than that it was made of sawdust and cement, but a recent number of the *Bautechniker* gives a variety of additional particulars, which we are sure will be interesting, not only to our correspondent, but to many others. Xylolith, or steinholz, or wood-stone, is made of magnesia cement, or calcined magnesite, mixed with sawdust, and saturated with a solution of chloride of calcium. The pasty mass, before the cement sets, is spread out into sheets of uniform thickness, and subjected to an enormous pressure amounting to more than a thousand pounds to the square inch. The compressed sheets are then simply dried in the air. The original invention of this material dates back to 1883, but it is only within the last five years that a single firm, that of Otto Sening & Co., at Pottschäppel, near Dresden, has undertaken the manufacture of it on a large scale, and has met with such success that it is already engaged in the erection of extensive additional works in the Austrian territory, to supply the South German market. In 1888, a series of tests of xylolith was made at the Royal testing-station for building-materials in Berlin, covering its chemical as well as mechanical qualities. In resistance to tension, it was found, naturally, that the dry material was much superior to the same soaked with water, dry specimens resisting a tension of about 100 pounds per square inch, while pieces saturated with water resisted only two-thirds as much. Soaking the dry material in linseed oil increased the tensile strength about ten per cent, and freezing diminished it slightly. The resistance to compression proved to be about 300 pounds to the square inch. This was diminished about ten per cent by freezing, and increased to about the same extent by careful drying and saturation with linseed oil.

THE specific gravity of the new substance was found to be 1.553. The fractured surfaces showed a yellow color, with a perfectly uniform and close grain. When immersed in water, unbroken sheets of perfectly dry material took up 2.1 per cent of their weight of water in twelve hours, and 3.8 per cent in two hundred and sixteen hours. Broken pieces absorbed in the same time about twenty per cent more water than the unbroken sheets. To try the resistance to the influences of the weather, a large number of samples were taken, and subjected to boiling in water, brine, soda-lye, hydrochloric acid, and solutions of sulphate of iron, sulphate of copper and sulphate of ammonium, alternating the boiling with sudden cooling. After several days' treatment with hydrochloric acid a loss of 2.3 per cent in weight was observed, but the properties of the pieces under test were not perceptibly affected. In the other cases no loss of weight could be detected, nor was there any other apparent alteration, and the liquids used for treating the samples remained perfectly clear. Exposure to superheated steam, in a Papin's digestor, also produced no visible effect. In hardness, the material was found to occupy a position between feldspar and quartz, being scratched by the latter, but not distinctly so by the former. As a conductor of heat, the xylolith was found to rank between asbestos and cork, being, therefore, one of the best non-conductors known. To test its fire-resisting qualities, sheets were exposed for three hours to the flame of a Bunsen gas-burner, by which the actual surface touched by the flame was charred, although there was no crumbling, or extension of the charring beyond the marks of the flame. Similar pieces, laid on the burning coal in the fire-box of a drying-oven, and kept for some time at a red heat, were rendered brittle, and crumbled at the edges, but kept their shape and cohesion, and showed no sign of breaking into a flame.

FOR use, xylolith is delivered in sheets, from a quarter of an inch to an inch and a half thick, and of all sizes, up to a metre square. The dimensions are almost unchangeable by dryness or moisture. A sheet measuring one metre square, when perfectly dry, will expand from one to two-tenths of one per cent when soaked in water, and a moist sheet will contract in drying to about the same extent. Being so little subject to contraction and expansion, it is extensively used for floors in railroad stations, hospitals and similar buildings, and for decks of vessels. It is readily planed, sawed, bored and fashioned with ordinary wood-working tools, and may be painted or decorated in the same manner as wood. It is itself nearly waterproof, and with suitable putty in the joints, and, a good coat of paint, it may be made entirely so. It is not surprising that a material possessing so many advantages should have come into extensive use abroad, and we trust that its manufacture may be introduced here. It is sold in Germany, in sheets of thickness suitable for flooring, at about seven cents per square foot, and the laying costs, complete, about four cents more.

EVEN the perfect drill and the experience which the fire-department at the World's Fair has had in handling the many beginnings of fires that have raised their threatening tongues during the construction of the Fair buildings were unavailing to prevent a score of deaths being the result of the burning of the Cold Storage Warehouse, just inside the grounds, on Monday last. As usual the newspapers, which from the outset have seemed to consider it the proper thing to attack the Fair and its management at every chance, are filled with rumors and reports which can hardly assist the Fair and can do no real good. The disaster has happened, it might, of course, have been prevented. Similar disasters in some of the other buildings also might happen and they ought not, and, if human endeavor can accomplish it, they will not happen. Yet when one considers the disasters of all kinds that may attend the congregation of people under the conditions that exist during exhibitions, with their temporary structures and hasty preparations, it is wonderful that the sacrifice of life is not greater than it is. A certain amount of risk has always to be reckoned with by the promoters of exhibitions and unfortunately the visitors have to assume their share but in most cases they assume it knowingly. At Chicago the risks are greater than they have been elsewhere because the risk due to the mighty lake winds is parallelled by the risk which the employment of wood as the chief building-material unquestionably entails. But the same vigilance and care that have preserved the buildings until now will safeguard them until the Fair closes. The buildings are temporary and are not fireproof and there are few men other than the present mayor of Chicago, who has the reputation of being before all things a demagogue, who would talk of descending on the Fair in his might, examining all the buildings and putting a stop to all use and occupation of them until they had been made fireproof!

DOORWAYS.[1] — II.

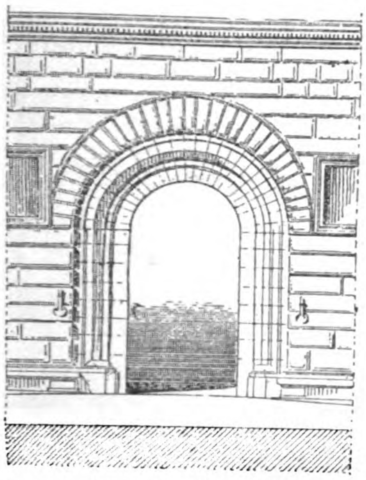


Fig. 7. From the Strozzi Palace, at Florence.

IN order to resume a nearly chronological order as to doors in general, let us turn to the period of the Renaissance, those of the so-called Gothic era having been made the subject of important studies and numerous drawings contained in the oft-cited work of Viollet-le-Duc — a work which is in the hands of every one. Moreover, in the principal articles of this encyclopædia, a variety of illustrations will be found which amply answer all demands for information.

It is at Florence that the doors of the new palaces reared after the fifteenth century break away from all Gothic tradition, while asserting the characteristics of Tuscan architecture, with rude and stern exteriors; such are the doors of the Pitti, Ruccelai, Riccardi, Mannelli and Pandolfini palaces (See "Italian Architecture," *American Architect* for November 14, 1891, *et seq.*), and that of the Strozzi palace (Fig. 7), with its arches of powerful keys.

In the sixteenth century, Vignola, who, on account of his works and writings, has been surnamed the law-giver of modern architecture, built his masterpiece, the celebrated Castle of Caprarola, for Cardinal Farnese. He adorned the entrance with a monumental door, between beautiful windows, and with a Doric entablature, supported by an arch whose rustic construction constitutes the entire decoration (Fig. 8). The excellent proportions and noble simplicity alone of the work show what a great artist can do with quiet tastes matured by the study of the masterpieces of antiquity, and not by the awkward copies that may be made from them. And because of this very simplicity and sobriety, like the ancient productions, this bit of modern architecture has become a model, a point of departure for a world of conceptions developed from it as a basis; while another masterpiece, the door of the "Vigne" of the patriarch Grimani (Fig. 9), constructed after the designs of Michael Angelo, has evoked grotesque imitations and exaggerations of defects, which the genius of the inimitable master, however, rendered imperceptible to the ordinary observer. This door, superb in appearance and of a proudly picturesque *silhouette*, has, nevertheless, been criticised on account of its useless columns, which bear only a decorative finial, and also for the queer form of the basement and of the steps leading to it, the whole cut and profiled after the manner of a fountain-basin. The accessories give it, in fact, the character of a monumental fountain, which should not have been suggested.

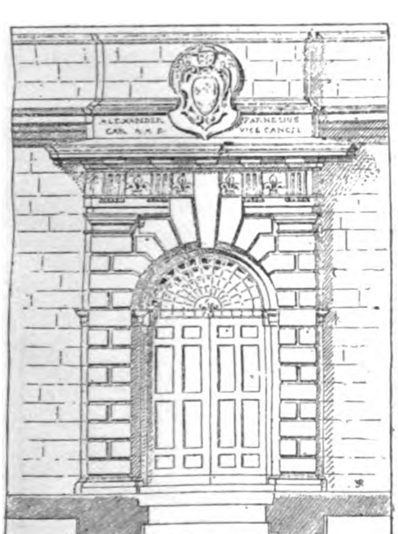


Fig. 8. From the Castle of Caprarola.

Fig. 9. From the Villa Grimani, Rome by Michael Angelo.

Fig. 10. From the Maison Jourde, at Cusset.

Vignola, by analyzing the effects produced by the ancient models, was able to deduce principles applicable to the form and proportions of works modern in composition, while Michael Angelo drew from his imagination alone those wonderful and as yet unpublished formulas of a sculptor's architecture. He paved the way for and precipitated the decadence to which Borromini and Oppenord were to put the last touches; Vignola opened up the path to correct studies, to the interpretation soon universally adopted, though not always rationally understood, of the rules of ancient art. Michael Angelo rudely closed the door to reasoning, and uom admiration by the sublime barbarity of his forms or the awful profundity of his ideas.

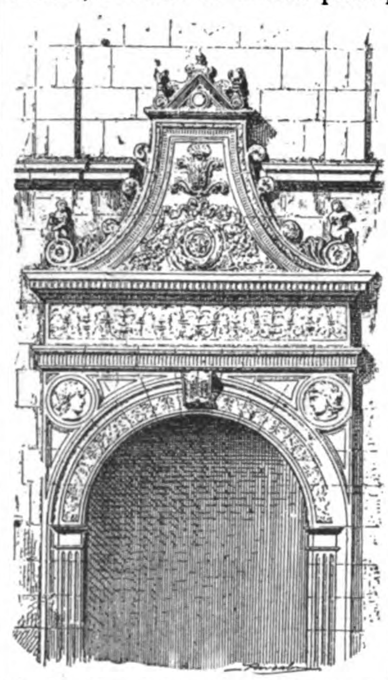


Fig. 11. Vaulted Passage in the Castle of Azay-le-Rideau.

However, though we may justly charge to the inaccurate genius of the one the picturesque decadence of the eighteenth century in France, we may also attribute to the correctness and mathematical absolutism of the other, or, rather, of his empirical precepts, the cold insignificance of monumental art and the narrowness of its teaching down to a very recent date.

Divided, at the beginning of the sixteenth century, between the skill and traditional formulas of the Middle Ages and the necessity of adopting the types imported from Italy, the French, Spanish and Flemish artists strove to take advantage of Neo-Latin dispositions and decorative details introduced from Italy into France, Spain and Flanders through the infatuation of princes, lords or prelates. They at first reconciled the new demands with Gothic ways of structure and decoration; they accommodated the new predominating *horizontals* to the old instincts of *verticality* constituting one of the characteristics of Gothic art. Of the latter, they preserved the composition of the whole, clothing it in so-called Italian forms, mouldings and ornaments.

In the doors of private dwellings, for example, the architect

[1] From the French of E. Rivoalen, in Planat's *Encyclopédie de l'Architecture et de la Construction.* Continued from No. 915, page 21.

abandoned the discharging-arch which had become ogival, or the Gothic *accolade*, for the straight lintel, sometimes slightly rounded near its bearings; but he surmounted it with a tympanum, sometimes included within the exaggerated frieze of an entablature, as is the case in the door (Fig. 10) of a little "hostel" of the sixteenth century at Cusset (Allier), and sometimes framed, as at the Castle of Azay (Fig. 11), with a sort of Flemish pediment recalling the Gothic gable.

It is maintained as a much developed motive surmounting the still low door of the trans-

Fig. 12. From the Château of Coucy, after Du Cerceau.

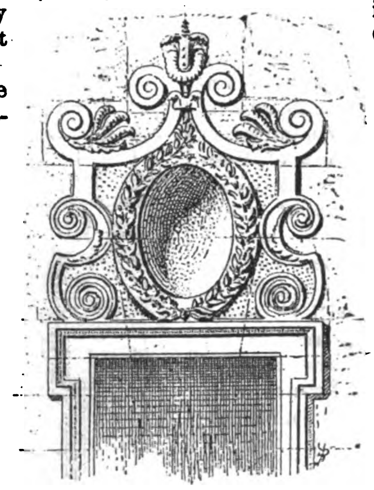


Fig. 13. From the Hôtel de Vogué, Dijon.

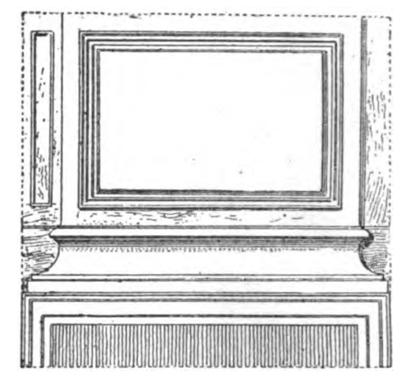


Fig. 17. Wooden Frieze-Panel, Seventeenth Century.

formed manors of the Middle Ages, like the frontispiece, the act of faith or the mark of nobility of the inhabitant. For a bourgeois, it presents perhaps a scene of religious imagery; while for the noble it may portray, as at Coucy (Fig. 12), an heroic episode in the life of an ancestor; or finally, as at Dijon (Fig. 13), it may show merely a monogram or an heraldic escutcheon surrounded by foliage.

Sometimes a secondary or service door, whether exterior or interior, is surmounted by an equilateral triangular pediment (a compromise between the Gothic gable and the antique

Fig. 14. Entrance to the "Commutation," Toulouse.

pediment) or by a circular pediment with a tympanum adorned with a shell: that is to say, this architectonic motive of the niches of the Roman decadence, revived by the Italians of the fifteenth century, became an article of current importation in the sixteenth in France. Under Henri II and Catherine de' Medici, Lescot and Bullant framed their doors with casings and surmounted them with pediments imitated from the fine models of antiquity. The more imaginative Philibert Delorme espoused the picturesque and rustic fancies of Serlio—whom he considered, he says, an artist of genius—and put them into practice at the Tuileries, at Saint-Maur, Chenonceaux, Fontainebleau, etc.

Elsewhere the artists of the provincial schools mixed the Classic style of these Parisian or Italian masters with the peculiar characteristics suited to the climate, materials and local customs and traditions; and these mixtures sometimes bore clearly the stamp of influences produced by a neighboring art.

In Burgundian architecture, of such an original and picturesque character [See "*Bourgogne*"], special study has been devoted to this motive, to which we will add the example of a door opening on the terrace of the Hôtel de Vogué (Fig. 13). The crowning, which is of secondary importance, exhibits in its silhouette indisputable traces of Flemish influence; the con-

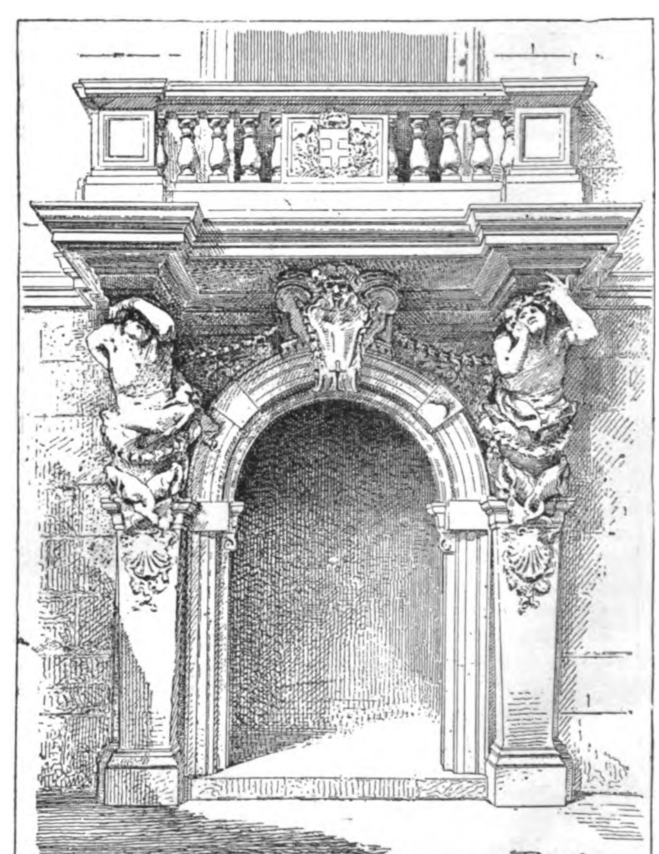


Fig. 15. Entrance of the Hôtel de Ville, Toulon.

ceit is quite odd, but is corrected by the delicacy of the design and the skilfulness of the arrangement.

The door of the "Commutation" at Toulouse (Fig. 14), is also of the beginning of the sixteenth century; it is attributed

to the leader of the Toulousan Renaissance school, Nicolas Bachelier. This bit which recently still adorned the entrance of a store, after having decorated that of the Capitol (from 1555 to 1671), is to-day restored to an honored place as a monument of local history in the Botanical Garden of the town.

In the seventeenth century, the great sculptor Puget was engaged in architectural work. But, although a follower of Michael Angelo, whose energies seem to have inspired him, and whom he imitates in his superhuman strength and sometimes in his brute force or size, Puget remained French, that is to say, rational and free from pompousness. His door in the Town-hall of Toulon, executed in 1659 (Fig. 15), a plain, simple work, betrays a certain research in the field of ancient architecture,—a study conducted by one whose temperament was too fiery to allow him to rest in the calm and serenity characterizing the noble models of antiquity. His caryatides live, suffer and shrivel, like the doomed of Dante, beneath a crushing weight, instead of bearing an entablature with the ease of those of ancient art, which personified static force and passive resistance — not sinewy effort. However, simplicity and truth coupled with energy are Puget's characteristic qualities, and not nobility. He has too often modelled and carved frisky ocean sprites for the prows of royal vessels, to rein in the fury of his movements or still the intense life of his muscling, when carving in stone. But in sculpture as in architecture he was able to maintain beauty of form and harmony of proportions, in spite of projections and distortions.

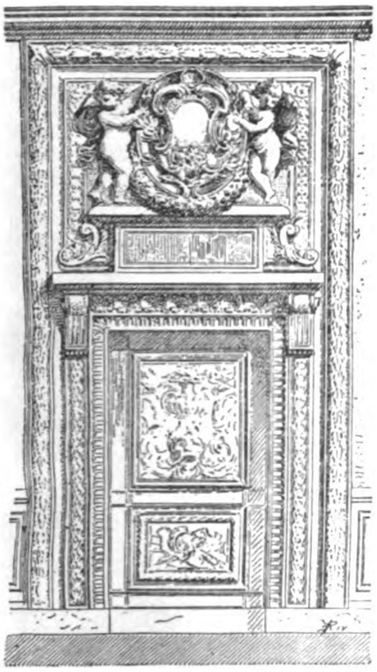


Fig. 16. Interior Door, after Le Paultre.

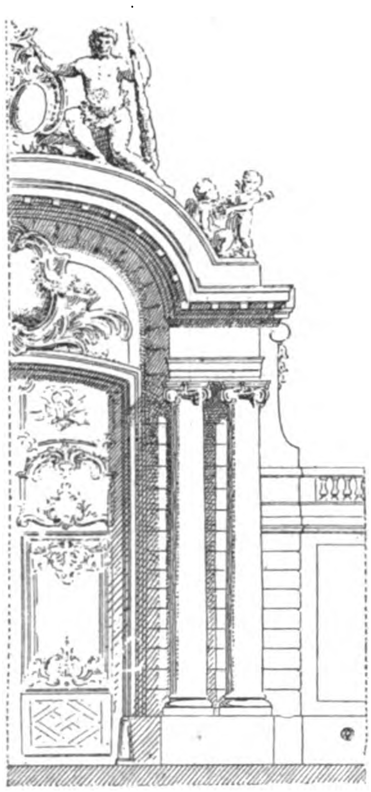


Fig. 18. From the Hôtel de Lassay.

Fig. 19. Old Hôtel, Dijon.

While Mansart (François) was sinking and framing his grand and beautiful doors of seigneurial mansions or churches in a kind of coved niche, — a disposition in vogue until the end of the eighteenth century and one that well indicated the opulence or grandeur of the place, while at the same time preserving a simplicity not inconsistent with nobility; while Lemercier, Le Muet and Antoine Le Paultre strove to secure convenience and give a grand air to the entrances of their houses, *hôtels* and castles, adapting them in general character to the degree of importance enjoyed by the proprietor, Jean Le Paultre (brother of Antoine) was lavishing the treasures of an inexhaustible imagination upon compositions marvellously

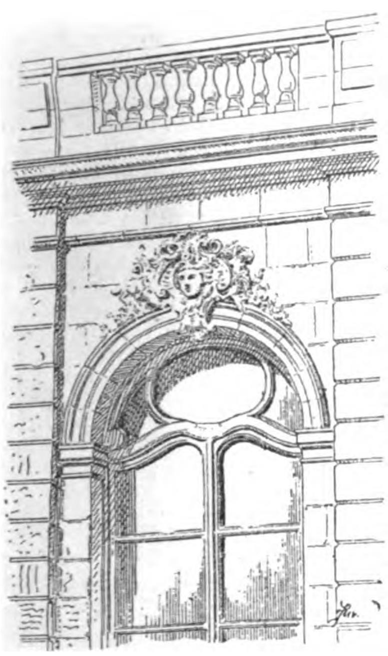


Fig. 20. From the Hôtel de Matignon, Paris.

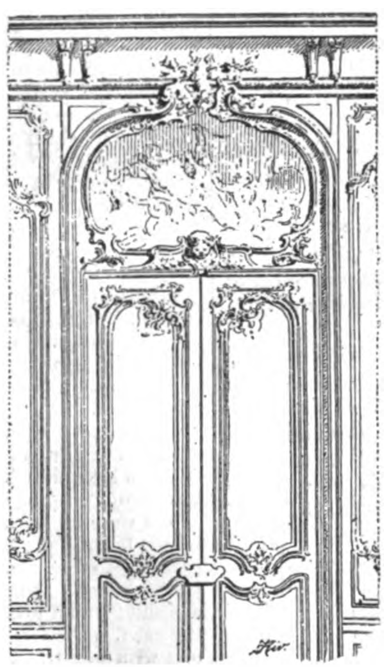


Fig. 21. Interior Door, Hôtel de Soubise, Paris.

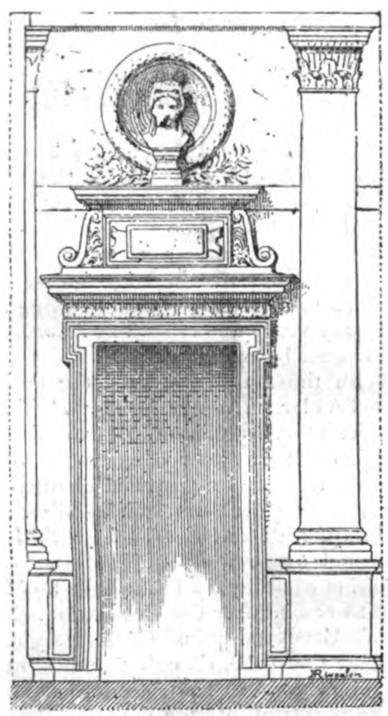


Fig. 22. From the Grand Staircase of the Court of Cassation.

carved by himself. And it is from these sources that artists reaching out after intelligent originality, elegance and wealth have drawn and are still drawing inspiration. Figure 16 gives one of the beautiful interior doors composed by this preëminently French master. It is indeed a seventeenth-century bit, with its grand character, severe form, sober decoration and powerful projections; these qualities and features are brought out still more by the calm of the *nus*, on the one hand, and the sumptuousness of the ornamented mouldings, on the other. The whole, substantially framed by a robust casing, forms with ceilings and wainscoting a correct and austere *ensemble*, in spite of the petulance exhibited in the composition, in spite of the splendor of the golds, the vividness of the coloring and the boldness of the contours trenching on the sombre green of the tapestries.

Even in modest apartments, the frieze-panel or attic above the casing (Fig. 17), destitute of ornamentation and almost without mouldings, gave a grand appearance to the passage, which was often quite narrow before "le grand Roy," in his palaces, and, later, the Louis XV "paniers," introduced double doors almost everywhere. The *portes cochères* of certain great mansions like the Hôtel de Lassay (Fig. 18), became veritable monuments in the eighteenth century, as were the pylons of the Egyptian temples of remote antiquity.

In the provinces, people prided themselves upon a luxury nearly akin to that described above; such is a door in a *hôtel* at Dijon (Fig. 19), with its attributes and its broad marble slab, which has now disappeared, and which bore an inscription; the latter formed an elegant and simple frieze-panel; the attributes are disposed *en chute* on either side of the door.

The façades overlooking the gardens of these stately houses were pierced with broad, lofty bays spaced to secure proper balance, and, while in the interiors the fancy of the decorator was free to intertwine modillions and foliage, and introduce all sorts of interlacing patterns and wreaths gleaming with gilt, on the exterior a plain casing was used around the window-bays, as in the Hôtel de Matignon, at Paris (Fig. 20); the key was simply ornamented with a small piece of sculpture, often with a genuine masterpiece in workmanship and adjustment. Within, the wood seems to have become perfectly pliable under the hand of a sculptor like Harpin at the Hôtel de Soubise (Fig. 21), or of an architect like Boffrand or Blondel; and these sober, graceful conceits were placed almost parsimoniously at the top or bottom of a large panel-frame, or on the key of a basket-handle arch or in the gorge of a cornice.

Russia, Germany, Sweden, Norway, Parma and Rome, even, copied the charming archness and chubby conceits of the French *rocaille;* foreign princes and sovereigns paid the French artists of the eighteenth century the honors awarded to Italy by the Valois monarchs of the sixteenth.[1]

But one need but glance at the reproductions of the works designed or executed by the various French artists settled abroad, about the time of Louis XV, to see that they did not become acclimated everywhere, and that the moral atmosphere or surroundings are in large measure the source of life for a master's talent. The most charming *rocaille* transplanted into Germany very quickly became *rococo.* It can hardly be taught, and cannot be exported.

With the reaction toward the antique which we have discussed under "*Pilastre*" and "*Piédestal,*" the forms suddenly become severe and rectilinear again at the end of the eighteenth century, constituting, as it were, a new Renaissance; this was at first of a powerful character, owing to the comparatively strong contours and profiles. It reminds one of the wealth of Le Paultre. Then, with Louis XVI, everything is thin and over-refined; we return to a more or less indirect imitation of antiquity to more or less faithful copies of nature, only to reach, after the Revolution, the style of the Empire, a pseudo-Greek and pseudo-Roman style, the anæmia of archaism.

Since that time, though fine bits of architecture and works full of originality have seen their day — such, for example, as the beautiful interior doors of the Palais de Justice and of the Court of Cassation, by Duc (Fig. 22) — it is true we have lived very largely on the past, composed and designed from pseudo-ancient architecture. This has been done with greater or less intelligence and success, with greater or less originality in the interpretation or the disguised copy. Yet we have never spoken so freely or so warmly of artistic propriety as we do to-day.

E. RIVOALEN.

[1] At St. Petersburg, La Mothe was the first architect; at Berlin, Le Geay; at Copenhagen, Jardin; at Munich, Cuvilliers; at Stuttgard, La Guépière; at Manheim, Pigage; at Madrid, Marquet; at Parma, Petitot; in the Duchy of Zweibrücken, Patte, author of the following remark on architects called abroad by the sovereigns of the different nations. "Our sculptors," said he, "are likewise scattered everywhere: Sally at Copenhagen; Hutin at Dresden; Larchevêque at Stockholm; Gillet at St. Petersburg." . . . . etc. (Patte, "*Monum à Louis XV.*")

ANOTHER ARCHITECTURAL KNOCKABOUT.[2] — VIII.

IT really seemed like home to me as we wandered around this quaint old town. A "country fair" was in progress. Here we both distinguished ourselves by shooting at plaster images and targets, which, when hit on the bull's-eye, caused a cannon to explode. As the distance from the shooting-platform to the target was hardly fifteen feet we rarely missed — in fact we hit so often that we ruined the proprietor of the shooting-gallery, as his cannons all burst from too constant use, and his powder gave out. We were requested to desist from shooting, as we never paid a centime, owing to the rule printed on the outside of his establishment declaring that if two consecutive bull's-eyes were made nothing was to be paid for the five shots allowed. It was simply child's play — but to see the soldiers of the town and the natives themselves miss again and again amused us greatly. Our record at this sport gained us no end of reputation on the fair grounds, and when it was known that we were Americans we were avoided as if we had been lepers. The villagers were positive that we bristled with revolvers and shooting-irons of every description and were quite ready at a second's notice to open fire upon them.

After making a few sketches, we journeyed to Bordeaux and from thence to Poitiers. Here, receiving word from home that we must hurry back, we decided to take the steamer "*Britannic*" back to America and, as that vessel left in a few days from that time, we cast about us to see if it were possible to catch her.

On inquiring at the hotel at Poitiers about immediate *trains-de-luxe* to Paris, I was informed that a "Queen's Special" from Lisbon or Seville passed through the town *en route* for the great metropolis in an hour, but as that was a private train and only stopped for two minutes to throw off or take on some mail-bags, it was impossible to get a passage, and there was no other until midnight.

I did not stop to hear more, but begged George to hurry and get his luggage ready, telling him rapidly as I packed my own what I was about to attempt. We soon got off to the station. My cousin readily and cheerfully fell-in with my scheme as I explained that to be able to catch the steamer at Liverpool it was vitally necessary to get to Paris immediately, and to do this we must board this "Queen's Special," come what might. So into the station we rushed. Taking two porters aside I explained to them the situation and, making them comprehend it better by a liberal tip, I unfolded to them the following plan: when the train came to a standstill, they (the porters) were to knock furiously at the door of the baggage-car if it were closed, and as it was opened to see what the disturbance meant, they, without a word, were to thrust our trunks aboard and quickly retire, giving no explanation to the officials aboard the train.

As the train only stopped for two minutes, I felt certain that the trunks could not and would not be put off in that time. Meanwhile George and I would manage about boarding the train with our smaller luggage. The Frenchmen grinned and promised faithfully to do all I requested. Then we went and quietly bought our through tickets to Paris, which were sold to us without a word or look.

We were let in through a fence-gate to the tracks with our luggage by the faithful porters, as the passenger-gates and doors of the station were, of course, closed. We placed ourselves in a position to jump aboard. It makes me smile as I write this, to think of the curious sight we all presented; George and I astride our grip-sacks, on the alert, while farther up the platform were the two grinning porters with our trunks, and taking the whole affair as a grand lark, ready to fling them aboard according to orders.

With a rush and roar in came the train, the engine made completely of shining brass, and with only a baggage-car, a buffet and a private dining-room, and the compartments of her august Majesty.

At the moment the train came to a standstill, I cast one look at the porters who dexterously fulfilled their part of the work, and darting to the steps of the buffet-car with my baggage, I flung it aboard, George doing exactly the same thing, and we both jumped aboard the now moving train. Out ran two or three officials and flunkies who endeavored to forcibly eject us.

[2] Continued from No. 915, page 24.

I commenced to argue to gain time, but as they tried to push us off, we hung to the railings until the train got full headway — those were the longest two minutes I ever knew.

We were on the train, there was no doubt about that, and it did not stop until it reached Paris either. At once we were drawn roughly inside and, seated at a table in the buffet-car, were put through a very minute examination by the astonished and angry officials. I endeavored mildly to explain in reply to the Conductor-General's (or whatever he was) exclamations to this effect: "What impudence in us to take this train, in such a manner also." "Did we not know that this train was the Queen's own, and that no *οἱ πολλοί* rode upon it, etc."

I replied that we were two peaceable Americans who took the first train to Paris we could get, and we were going to stay on it too. "How should we know," I said, "that this was a 'special' or 'royal train?' They sold us our tickets at the depot, and must one ask every time one wants to take a train 'Is this a private car?' or 'Has this train been chartered by the "Cid" himself?' How absurd," I continued, "we can't help it now, and as for the resistence and rough treatment we have undergone, are we to receive an apology from the conductor for it, or are we not?"

This piece of impudence and the explanation of our actions and our appearance so took his breath away, that he was utterly speechless for a while: then I informed him that if he would acquaint Her Majesty with the facts of the case, I would make our most abject apologies to her "Grace" for our apparently unseemly conduct. This he did, much to my surprise, and we two culprits were marched through the train to the royal compartments and soon stood in the august presence of the Dowager Queen of Spain. A smile suffused her face as I, in my best Franco-Spanish tongue, apologized for our intrusion in the most flowery language. I even went so far as to offer our services as pages, or even as stokers on the journey to Paris. (I had rather a hard time to say the word "stoker" in either French or Spanish.) She smiled very nicely and said that "we were forgiven, if we would put up with a seat in the buffet-car and take dinner with herself and suite afterwards." Overpowered by such graciousness, we confusedly bowed our thanks to the now convulsed royalty.

Back we went to the buffet-car and were received with open arms and gracious bows and smirks by the conductor, lackeys, flunkies and pages.

We put on all the lugs we possibly could think of, compatible to such petted favorites of Her Majesty. It worked splendidly, too: drinks and cigars were set before us, our shoes were polished, our clothes brushed, handglasses were offered us and in fact everything was done to make us happy and luxurious. We had never travelled "*en prince*" before, and George and I grinned from ear to ear when the admiring eyes of the Queen's retainers were not upon us.

As for the dinner — it was a banquet! We sat a few seats from "Her Graciousness" and made ourselves as agreeable as we could. I conversed in bad Spanish to a bad Countess at my right — and discussed the virtues and faults of cigarettes and cigars of American manufacture — with a decrepit Marquis for my *vis-à-vis*.

An occasional remark fell from the Queen concerning America, and on being asked if we were travelling for pleasure merely? I answered that we were, although I represented Labor if there was any, as I was an architect and had been sketching through Spain. I was asked if I had any sketches with me — whereupon I produced my sketch-books which seemed to produce a favorable impression upon all present, which fact put us well at our ease and made the otherwise most peculiar and singular dinner a very pleasant one. How droll it all seems now! We were sorry indeed to leave the train on its arrival at Paris where I had the honor of going through the ticket-gate with the Queen herself. We expressed our great gratitude and reiterated our apologies to her and the curtain fell upon the scene, which instantly became a memory.

Off we rushed, laughing heartily at our late experience. We drove directly to the Hôtel de Florence — where I had been before, and it seemed like arriving home again, to be greeted so cordially by the old *concierge* who recognized me at once and called me by name. This is one of the pleasantest things that can happen to an old traveller, that of being recognized and known at once by an old *padrone* or *maitre d'hotel* after returning to a place after a long absence.

Thus we came to the end of our journey; we rushed over Paris — I knew the ropes and (as usual) became mentor to George who in that brief visit enjoyed himself greatly I am sure. I took him at once to the "Quatier Latin" where we had a Bohemian dinner with many of my old friends — all of whom I had known at home or met two years before in the "Quatier" there.

It seemed strangely familiar and it seemed also to be impossible that such a length of time had elapsed since my last "Knockabout" there. Then taking a fond farewell of the peculiar places and the splendid city itself, George and I started for London, via Dieppe and Folkestone, which latter city we reached after a very rough night passage on the Channel.

Arriving at London we went to our Hotel Arundel where we sat down to think it all over. Here we were back again at our starting-point, nearly five months later, and both of us alive and comparatively well, though I still felt the effects of the Spanish cuisine. We both simultaneously arose and shook hands on the fact of having returned intact and "unstilettoed."

We made but a few purchases in London, owing to our limited capital, then calling upon the N——s, who gave us another farewell dinner, we speeded for Liverpool and taking our good ship "*Britannic*" after a very rough voyage, which made us two days overdue, we arrived happily and safely and were welcomed in our families as joyfully as the advent of unexpected legacies. Thus ends this Architectural Knockabout, and my observations of Spain, fleeting though they were, proved a realization of many fond hopes and dreams — and the memories of Grenada, the Alhambra, Anita, the flower-girl, and the old Bohemian life, which I in a small way participated in, comes back to me, as alone with my pipe I sit and muse upon it all. So, good friends, "here's an end on't."

Go for yourselves — and just to celebrate the possible event of your departure, I mix a brew in my gas-jet sauce-pan, and so I pledge you and the profession all success — and may you have as good a time stinting and starving through Europe as I did, live your own Knockabout and return as I did satisfied for a little space of time.

F. L. V. HOPPIN.

[The end.]

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

PRESENTATION OF THE ROYAL GOLD MEDAL.

THE closing meeting of Session 1892–93 of the Royal Institute of British Architects was held on Monday evening, June 19, at Conduit Street. The meeting was preceded by a reception in the lower galleries, and at half-past eight the members and visitors (including a large number of ladies) adjourned to the meeting-room, where the President, Mr. J. Macvicar Anderson, took the chair.

The President said that on such an occasion as the present it was, of course, gratifying to see present amongst them as many of the past Gold Medallists as possible. It was with sincere regret that they had received letters from M. Garnier, M. Daumet and M. César Daly, explaining their inability to be present, but he was pleased to see present on that occasion past Gold Medallists in the persons of Sir Henry Layard, Mr. Ewan Christian, Mr. Charles Barry, and last, though not least, Sir Arthur Blomfield.

The President, who, on rising to make the presentation of the Royal Gold Medal, was received with applause, said:

Colleagues and Gentlemen, — For the third time it becomes my privilege, as your representative, to present the Gold Medal which Her Majesty, the Queen, graciously confers each year on such distinguished architect or man of science of any country as may have designed or executed a building of high merit, or produced a work tending to promote or facilitate the knowledge of architecture in the various branches of science connected therewith. Two years since, I was permitted to be the medium of conferring this honor on an eminent English architect, whose name and works are alike appreciated and known by all in the realm of art — Sir Arthur Blomfield. Last year, no one who was present on the occasion can have forgotten the venerable Frenchman who accepted from my hands this gift of the Queen, or the striking address in which he testified his appreciation of the honor — an address which, as we were subsequently informed, had been perused with no ordinary interest by Her Majesty. It is gratifying to know that the prolonged and active life of Monsieur César Daly is still absorbed in the study of the art to which he has dedicated his powers, and ennobling to find octogenarian energy of such exceptionable vigor devoted to the pursuit of a cause so commendable, so irreproachable and so well calculated to benefit society. I have thus experienced the happiness of presenting this royal gift to an Englishman and to a foreigner; but when I regard the proceedings in which we are now engaged, I feel some difficulty in deciding what is the nationality of the recipient of the Royal Gold Medal in 1893, for the distinguished architect whom it is at once our pride and our privilege to be permitted to honor can scarcely be defined either as an Englishman or

as a foreigner. He is, no doubt, an Englishman in the sense that he speaks the Anglo-Saxon language, but, on the other hand, he is not an Englishman in the sense that he was born and finds a domicile beyond the limits of the British Empire. He is, no doubt, a foreigner in the sense that the scene in which he has achieved celebrity is not British soil, but, on the other hand, he is not a foreigner in the sense that his nationality is so intimately linked to our own that we scarcely regard it as separate or distinct. What shall I say, then? If he is not an Englishman, and if he is not a foreigner, there is but one word in our vocabulary that will truly describe his nationality — he is an American. Thus, whatever interest may have been associated with any or all of the forty-five eminent men on whom this medal has been conferred, it is obvious that the present occasion has no parallel, and is, indeed, unique, for we are about to do honor to a citizen of that great Western Republic, one whose name we are proud to enroll as one of our Royal Gold Medallists — not only on account of high personal and professional merit, but also because he is the first American whose name will appear in that roll-call of illustrious artists. That the selection should this year have fallen on one who has designed the principal building in the great Columbian Exposition which attracts the world's sight-seers to Chicago at the present moment, and which will hereafter associate the name of America with the most wondrous development that international exhibitions have ever reached or are ever likely to attain is, to say the least, a singularly fortuitous coincidence. In honoring Mr. Hunt in recognition of his eminence and of his works as an architect, we rejoice that we are thus able to pay a graceful tribute to the United States in the person of one of her most distinguished sons.

The art of a new country is necessarily devoid of the native inspiration and guidance to be found in the history of centuries and in ancient monuments, which are the glory of older countries. In the case of America, the possession of boundless resources and of illimitable wealth — the rapid development of which almost appals us — without the accompaniment of the experience of the past to guide lavish indulgence, presents a condition which, in respect of art, is beset with temptation and pregnant with danger, for without the restraining curb of necessity broad and easy is the road from luxury to extravagance, from liberty to license. In such circumstances, who will be so bold as to define or limit the influence exercised, for good or for evil, by the early masters of the arts in America. It cannot but be well, indeed, that the development of her architecture has been inspired by one possessing the refined taste, the educated judgment and the cosmopolitan experience of Richard Morris Hunt.

On the other side of the globe — even in these days of rapid intercommunication — men are born, rise to eminence, guide the interests of vast communities, reap great honors and pass away, creating comparatively little stir in the popular imagination here at home. Hence, if the name of Mr. Hunt — although well known to us — is not a household word in England to the same extent that it is in America, it is not because his achievements are less renowned or his works less important than those of men whose names are more familiar to the public here, but simply because we are geographically separated by the few thousand miles known as the Atlantic Ocean. I offer no apology, therefore — unless it be to Mr. Hunt for referring in his presence to his life and work — if I venture to review some of the more prominent particulars of his career, which I feel sure cannot fail to be of interest to all.

Mr. Richard Morris Hunt, born in Brattleboro', State of Vermont, in 1828, comes of an old New England family, and is the son of the late Honorable Jonathan Hunt, Member of Congress. On his father's death, his mother removed to New Haven, and his education was commenced at French's School, and continued at the Boston High School and Latin School. In 1843 — at the age, therefore, of fifteen — he accompanied his family to Europe and entered a school at Geneva, commencing the study of architecture with Samuel Darier. From Geneva he went to Paris, and studied under Hector Lefuel, entering the École des Beaux-Arts in 1845. On leaving the Ecole, he travelled through Europe, Asia Minor and Egypt, and on his return to Paris in 1854 he received from the French Government the appointment of "*Inspecteur des Travaux*" on the new buildings uniting the Tuileries to the Louvre. His master, Lefuel, having, during his absence, succeeded Visconti as architect, he was put in charge of the Pavillon de la Bibliothèque, opposite the Palais Royal, and had the honor of making, under Lefuel, all the studies and full-size drawings of that pavilion.

Having thus stored his mind with a knowledge of some of the celebrated monuments of the Old World, and acquired practical experience, he returned to America in 1855, at the age of twenty-seven, and spent about six months in assisting the late Thomas U. Walter at the Capitol at Washington. He then, at New York, commenced the practice of his profession, to which he has enthusiastically devoted his powers through an exceptionally busy and distinguished career.

Shortly afterwards he took an active and prominent part in founding the American Institute of Architects, a body which now has Chapters in various parts of the United States. He succeeded R. M. Upjohn and Thomas U. Walter as President, and subsequently was elected President of the Institute under its reorganized constitution. He was also for several years President of the New York Chapter of the American Institute.

Soon after commencing his career in New York, Mr. Hunt opened an architectural *atelier* for students on the French system, thus demonstrating in a practical form the native energy of his mind and the influence which his European studies had exercised. Many of the leading architects in America to-day — such men as Prof. William R. Ware, George B. Post, Frank Furness, Henry Van Brunt, Charles Gambrill and others — were students in this *atelier*, and it is natural that Mr. Hunt should feel proud of the eminent position they have achieved, for who will venture to say how much they owe to the teaching and inspiration they received in the first American *atelier!*

In 1867, Mr. Hunt served as a member of the Fine-Arts Jury at the International Exposition in Paris; in 1876, he held the same office in the Centennial Exhibition at Philadelphia; and in the present year of grace he served as a member of the Fine-Arts Jury of Selection and as President of the Board of Architects at the World's Columbian Exposition at Chicago.

In 1882, Mr. Hunt received from the French Government the decoration of the Legion of Honor, and was elected a Corresponding Member of the Institut de France in the following year. He is an Honorary Member of the Société Centrale des Architectes Français and of the Architects' and Engineers' Society of Vienna, and an Academician of St. Luke at Rome. He has been highly honored by Harvard University, the oldest and foremost seat of learning in America, which conferred on him the degree of LL.D., the first ever conferred by that university on an artist. Lastly, we have ourselves the honor of claiming Mr. Hunt as one of our Honorary Corresponding Members, and, in anticipation of the more intimate relationship we are now about to assume, it may not be uninteresting to note the views which have been expressed on behalf of both the United States of America and of France with reference to Mr. Hunt's acceptance of the honor which we are now permitted to be the medium of conferring on him. . . .

From France, the President of the Société Centrale des Architectes Français thus addresses Mr. Hunt:

"Paris, le 8 Avril 1893.

"Mon cher et honoré Confrère, — Le Bureau et le Conseil de la Société centrale des Architectes français m'ont chargé de vous adresser les vives félicitations de notre Société pour l'honneur si justement mérité que vient de vous conférer l'Institut royal des Architectes britanniques, en vous octroyant, cette année, la grande médaille d'or de la Reine d'Angleterre.

"C'est, croyez-le bien, une profonde satisfaction pour nous de voir attribuer cette haute et rare distinction à un architecte que beaucoup d'entre nous ont connu, estimé et aimé comme condisciple à l'Ecole des Beaux-Arts à Paris et comme collaborateur d'un de nos maîtres les plus éminents, M. Lefuel.

"Nous aimons à penser que c'est un peu l'architecture française qui vient d'être honorée en votre personne en même temps que l'architecture américaine.

"En tout cas, c'est de grand cœur que je me fais l'interprète de félicitations, auxquelles je m'associe pleinement, envers un membre correspondant de la Société centrale des Architectes français, envers un artiste à qui son talent et ses mérites ont valu le titre de correspondant de l'Académie des Beaux-Arts.

"Veuillez agréer, mon cher et honoré confrère, l'assurance de mes meilleurs sentiments confraternels.

"Le Président de la Société centrale des Architectes français, Membre de l'Institut. H. Daumet."

I have referred to these communications because it is pleasant to be thus assured that he whom we delight to honor is held in equally high regard by his compatriots alike in the United States and in France. To describe in detail the work of an architect whose practice has been extensive and varied entails considerable labor, and it would seem to be superfluous in the present case. Mr. Hunt's principal works, most of which are of Classical design, are characterized by both vigor and purity in composition, and many of them are well known to some here this evening.

I have said enough to demonstrate, were demonstration required, that the recommendation of the name of Mr. Richard Morris Hunt, which we humbly submitted to Her Majesty, is not merely justified by the meritorious works and by the distinguished career of the man, but has been confirmed by the unanimous testimony of those who are best able to judge of his qualifications both in Europe and in America.

Mr. Hunt, in presenting to you this gold medal, the gift of Her Most Gracious Majesty, Queen Victoria, I hand you what is the typical embodiment of the recognition by British architects of your distinguished and honorable career, and of the high architectural merit of your works. The fact that you have travelled some thousands of miles in order that you might personally receive this medal may be accepted as sufficient evidence of the high estimation in which you rightly regard the honor. It is, indeed, the highest which we are graciously permitted to offer to the most illustrious architects of the world, and we indulge the hope that our American brethren will recognize in this royal gift, which we are privileged to present to their most eminent representative, the embodiment of the hearty good-will, the sincere respect and the ardent admiration with which they are regarded by the architects of the Old World.

Mr. Hunt, in replying, said it would be useless to say that he was not in a most embarrassed position. Nothing that he could say would fairly represent his feelings of gratification and gratitude and

thankfulness to the Institute. He had been honored with numerous decorations by different institutes and societies, but the present gift of Her Majesty, the Queen, had a peculiar charm about it: it was presented by one's own *confrères*. He accepted it and was proud of it — proud of it for his country, for in accepting it he accepted it not altogether as a personal distinction or a personal honor, but as an honor conferred upon the whole profession in the United States, in which light it was so regarded "on the other side." Indeed, he would subdivide the honor with France. The Société Centrale des Architectes Français claimed a part of the honor, and rightfully so, because to the École des Beaux-Arts of France he owed everything. In the letter which had been read from the Société Centrale allusion had been made to his collaboration with his old patron, M. Lefuel, in the work at the Tuileries, and it might, perhaps, be of interest if he said a few words, by way of historical reminiscence, about the troubles and difficulties with which the architects for the completion of that work were met. He did not know that anybody now living knew the facts as he knew them. They all knew that the extensive works at the Tuileries and Louvre were commenced by Visconti, who made his designs for the work in the Empire style, like that of the Pavillon Marsan, facing the Rue de Rivoli. Although Visconti was a man of great merit, it was, in his (the speaker's) opinion, a godsend to France that he was replaced by M. Lefuel, because Visconti's work was not fairly representative of French architecture. When M. Lefuel was asked to undertake the work, he made it a condition of acceptance that he should have a *bureau des études*, and that the work should be carried out in the French style, taking as a guide the *petite façade* of the Louvre. But there were great difficulties in the way of the completion of certain portions of the works. Thousands of men were employed whom it would not have been politic to dismiss, and everything had to be driven. The *épannelage* had to be carried up according to Visconti's designs, and while that was being carried up the *bureau des études* was engaged in working out a totally different design. He merely alluded to this because there was one fault, he thought, in the Pavillon de la Bibliothèque, opposite the Palais Royal, namely, that the Ionic order on the second story was a little slim. The reason of that was that they could not get anything more out of it. What they wished to have there was the Ionic order of Philibert Delorme, which was that of the old Tuileries, but the *épannelage* having gone up in the shape in which it had gone, there was not sufficient stone left for the borders which Philibert Delorme would have introduced. The order was, therefore, a bit slim, though it was not the fault of M. Lefuel, who wanted to correct the defect by introducing marble bands such as Philibert Delorme used in the old Tuileries.

But he was, perhaps, becoming too tedious with these historical points. Since he had known that he was to be the recipient of the Royal Gold Medal, he had felt, frankly, that he had been too much favored as a follower of their profession. It was true that he had worked in it for now forty-nine years, but at the same time he had, perhaps, received too many compliments and decorations: he would, however, excuse the Institute for having been the medium of presenting him with the Gold Medal. But since he had to receive the honor — and there was no honor that he should esteem more highly — he did not think that the time of its presentation could have been better selected than in the present quadricentenary of America, which was being celebrated in the large exhibition buildings prepared for the "World's Fair" at Chicago. Did time permit, he should like to explain the *modus operandi* of the carrying-out of those buildings. Generally speaking, all other nations proposing to hold a great exposition had "taken Time by the forelock"; but that was not the case in regard to this World's Fair. It was a long time before the site could be agreed upon. New York wanted the Exhibition, Washington wanted it, and Chicago wanted it, and finally it was given to Chicago within less than two years of the time fixed for the opening. As it was unquestionably the greatest exhibition that had ever been held in point of area, at any rate, not much time had been lost. Almost the first question that arose was whether they should appoint an architect to design the whole of the buildings, whether the different buildings should be put out to limited or free competition, or whether the architects should be selected. The principle of selection was decided upon, and even if he had not been one of the architects selected, he should still have thought that the principle of selection was a wise one, for by selecting the architects for different sections of the work a great deal of time was saved. Months would have been lost if the buildings had been put out to competition. The Commission had the pluck to select architects from the different parts of the United States to carry out the various buildings, and the Commission had acted towards the architects in the most liberal spirit, being always anxious to do everything they could to get up an exhibition that should be worthy of the United States. If there was any fault to be found with the Exhibition buildings, the architects, and not the Commission, were to blame. The selected architects were called upon to make sketches of their allotted buildings after consultation with each other. They were a board of ten architects, five of them so-called "foreign" architects — *i. e.*, architects not practising in Chicago being entrusted with the buildings on the great *Plaza*. When they met they discussed the question of materials, and were reminded that, strictly speaking, iron construction, glass and tiles were the proper materials to be used for such buildings. But, they asked themselves, had that problem ever been satisfactorily solved? In his (the speaker's) personal opinion — and he was the chairman of the Board of Architects — it had not. He did not think that any of the Exhibitions or "World's Fairs" had had the monumental look about them that they should have had. But, they asked themselves, if that problem could not be solved in the City of Paris, where they had the best artists and artisans in the world, where they had the work right under their hands, and where they had had a twofold or threefold experience in the matter, would it not be futile and useless for them, at distances of a thousand miles apart and a thousand miles from their objective, to attempt to solve it?

The Fair grounds to be covered by the buildings were about 600 acres in extent. Would there not be hundreds of small, light and fancy buildings spread all about the grounds? At any rate, they resolved to seize the opportunity and to give to the buildings something of a monumental aspect — the principal buildings, at any rate. They resolved to work in the Classic style, perfect freedom being given to each architect, except that, in order to prevent one man outweighing another, a module of 60 feet as the height of the main cornice above the terrace was adopted, excluding towers, etc.; and they determined for the first time to introduce on a grand scale sculpture and painting, which in his opinion were absolute necessities, in monumental architecture. To give his hearers an idea of the Administration Building — the smallest yet the highest and most central of the World's Fair buildings, he would remind them that it covered an area of four acres; it was 280 feet high, and the dome was only about 6 feet less in diameter than that of St. Peter's at Rome. On that dome, which had been a great school for painters and sculptors, there were from sixty to eighty groups, with figures from 20 feet to 30 feet high. They looked upon that work as an object-lesson for the United States Government. In no country in the world was there so much money spent yearly upon public buildings as in the United States, and yet one man, the Supervising Architect to the Treasury Department, was called upon to build all the new post-offices, custom-houses and court-houses of the United States, from Maine to California, besides attending to keeping all the old ones in repair! Every Congress voted millions of dollars annually for public buildings, and there were on the books of that architect a few months ago at least 300 buildings. They had been trying for several years to break up that system. For one public building in Detroit, Congress had eleven years ago appropriated $1,200,000, and the works were still in the foundations! In regard to other buildings for which appropriations had been made, they had not even sharpened their pencils, or given the matter a second thought. But to return to Chicago. He should like to say that of all the forlorn places that could possibly have been, Jackson Park, the site of the exhibition, was the most forlorn when he and his architectural *confrères* first saw it. A good portion of it — quite one-third — was under water, but advantage had been taken of that circumstance in the general laying-out of the exhibition by the introduction of a new and beautiful feature in such exhibitions — that of water communications — an idea due to the genius of Frederick L. Olmstead and Harry Codman. On these waters visitors glided about in electric boats and launches. The earth dug out from these canals was made into terraces in front of the buildings. In conclusion, Mr. Hunt said he had again to thank the members of the Institute most sincerely, not only for himself but for the profession at large in the United States, for the honor conferred upon him, and he should try to hold himself ready to do all that he could to prove himself worthy of the honor conferred. (Mr. Hunt, on resuming his seat, was warmly applauded.)

The President said that the meeting had already learned, from the charming letter which he had read from Mr. Bayard, the Ambassador of the United States, the reason why he was absent that evening; but they were favored with the presence of the Secretary of the Embassy in London, Mr. Henry White.

Mr. Henry White, Secretary of the United States Embassy, said that although he should have thought it superfluous after the letter which had been read from his chief to have trespassed even for one moment upon the time of the meeting, he felt he could not refrain from expressing the very great gratification and high appreciation which not only they of the Embassy, but almost every one in the United States, could not fail to feel at the great honor done by Her Majesty the Queen, upon the recommendation of the Institute, to their distinguished countryman, Mr. Hunt. It would be superfluous and indeed presumptuous, in one who had no technical knowledge on the subject, to attempt to refer to Mr. Hunt's valuable services to architecture in the States; but his name was associated in the mind of every American with all that is most progressive and beautiful in the architecture of their country.

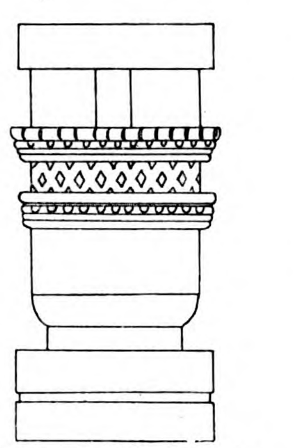
Baron H. von Geymüller, Honorary and Corresponding Member of the Institute, said he wished to be permitted, as a Correspondant de l'Institut de France and a *confrère* of Mr. Hunt come over from Paris for the present solemnity, to say a few words of the feelings of the Academy of Fine Arts on this occasion. Though he had received no mandate from the Académie des Beaux-Arts to represent the Institut de France at that meeting, he felt that there could be nothing unconstitutional whatever in his simply expressing, like a faithful document, what he knew to be the absolute truth, namely, the great sympathy of all the members of the Academy of Fine Arts who for many years had known Mr. Hunt personally, and the great

satisfaction they felt at the high distinction conferred on him that night. Two days previously, at the regular meeting of the Academy of Fine Arts, having asked M. Charles Garnier and the Vice-president, M. Daumet, if they were coming over to the present solemnity, he gathered, from the way in which they expressed their regret at being prevented from doing so, how warm an interest they took in the great distinction conferred on Mr. Hunt by his English *confrères* in the name of the Queen. Personally, not only as a foreign *confrère* often residing at Paris, but still more as nephew of Count Delaborde, the Permanent Secretary of the Academy of Fine Arts, he (the speaker) was often able to be a witness of the great sympathy of the Academy for their American *confrère*. Fully aware of this sympathy, and having some time ago to write to Mr. Hunt on some personal affair, he asked M. Delaborde if he might send his compliments to Mr. Hunt. He warmly answered about as follows: "Je crois bien, mais non seulement les miens, mais ceux de tous le Membres de l'Académie, car tout le monde l'aime beaucoup." It was his personal impression that Mr. Hunt enjoyed at the Academy of Fine Arts a sort of popularity, if it might be permitted to him to apply that word to the feelings of an assembly considered to be composed of immortals. Might he be permitted to add a few words more? He believed the choice of this year's recipient of the Gold Medal to have been particularly happy, since the distinction fell on an artist of whom old Vasari would no doubt have written: "*Fù il primo che introdusse in America il buon disegno.*" By doing so Mr. Hunt had become the Brunelleschi of the United States. The fact that the Old and the New Worlds were commemorating the fourth centenary of the Discovery of America was particularly fortunate. Did that fact not proclaim that the highest conceptions of art, of which the Academy of Fine Arts in France strove to hold up faithfully the immortal principles, were spreading over the whole world, and that those principles from which perfection alone derived were equally as well honored on the banks of the Thames and beyond the wide Atlantic as on those of the Seine?

Mr. Paul Sédille [*Hon. Corr. M.*]. — Messieurs et chers Confrères, excusez-moi tout d'abord de prendre ici la parole en français. C'est dans la langue qui vous est propre que je voudrais pouvoir m'adresser à vous pour exprimer aux Membres de l'Institut Royal des Architectes Britanniques, et à mon honoré confrère, M. Richard Hunt, en particulier, les sentiments de bien réelle confraternité qui m'animent. Heureusement que la plupart d'entre vous, Messieurs, sont plus savants que moi et que la langue française ne leur est pas étrangère. M. Hunt a passé d'ailleurs de longues années en France; je me plais à le rappeler en cette circonstance solennelle de sa carrière d'artiste. Il a conservé de son séjour parmi nous non seulement sa connaissance approfondie de notre langue, mais surtout de bons souvenirs qu'il ne manque jamais de rappeler avec une cordialité dont nous lui sommes profondément reconnaissants. Aussi, nous autres français, pouvons-nous être fiers de venir applaudir à Londres au grand honneur qui est fait à notre éminent confrère américain par les architectes anglais, en lui attribuant cette Médaille d'Or que notre vénérable M. César Daly recevait l'année dernière de vos mains, que, sans remonter plus haut, vous décerniez, il y a quelques années, à notre illustre maître et ami, M. Charles Garnier. Monsieur Hunt nous permettra de prendre grande part à son succès, car nous n'oublions pas, comme il le répète avec complaisance lui-méme, que c'est à l'École Nationale des Beaux-Arts de Paris, que c'est sous la direction de nos maîtres les plus reconnus, qu'il est venu se pénétrer des grands principes de son art. M. Hunt a gardé de ces études fondamentales une élévation de style, une distinction dans les formes qui ennoblissent tous les édifices, tous les monuments qu'il a élevés. Très sensible aux élégances de la Renaissance française, il a transporté au-delà de l'Atlantique les délicatesses de cet art charmant, tout en l'appropriant à des besoins modernes et à un milieu nouveau. L'hommage rendu en ce jour à un confrère américain réputé touche donc intimement notre cœur de Français, car nous pouvons considérer M. Hunt comme beaucoup le nôtre et je suis certain qu'il ne me démentira pas. Mais si nous sommes heureux de voir beaucoup de jeunes artistes américains suivre l'exemple dès longtemps donné par M. Hunt et venir chercher en France des leçons et des modèles, nous ne nous flattons pas que là seulement ils puissent trouver les enseignements nécessaires. L'art n'a pas une patrie restreinte, il est de tous les temps, de tous les pays, ses manifestations ne sont que différentes. Car des principes immuables gouvernent ces manifestations différentes, et si les formes apparaissent dissemblables, elles sont toujours dans leur diversité la consécration des principes de logique et de vérité qui sont la gloire de l'Architecture. La France ne saurait donc être que dépositaire d'une parcelle de cette vérité qu'elle a fait briller dans ses œuvres anciennes ou modernes suivant le propre de son génie. Cette vérité, nous devons la rechercher dans l'étude des monuments de tous les pays. Personnellement, je me suis fait un plaisir et un devoir de signaler les remarquables travaux exécutés en Angleterre depuis un certain nombre d'années, travaux qui témoignent chez vous, Messieurs, de cet ardent amour de logique et de sincérité qui doivent être, je le répète, la source la plus féconde de nos inspirations. J'ai admiré vos beaux travaux si expressifs des besoins matériels comme de l'idéal qui vous sont particuliers. Je suis heureux de pouvoir dire que maintenant mon admiration est partagée par grand nombre de mes compatriotes et que, spécialement, nous venons emprunter à l'Angleterre beaucoup de ce qui fait le charme de vos habitations à la fois si confortables et si pittoresques. Mais dans cet échange artistique d'idées, il ne faut pas oublier que ce qui convient ici ne convient pas là. A des besoins différents, il faut des formes différentes. Les principes seuls sont communs aux manifestations diverses de notre art. Il faut que nous restions Français comme vous restez Anglais, et il faut que les architectes américains deviennent réellement Américains. Dans notre vieille Europe, nous disons souvent en parlant de l'Amérique: "La jeune Amérique!" Je pense que mon confrère M. Hunt ne m'en voudra pas de cette appellation. C'est si beau la jeunesse! Et M. Hunt doit être fier de la représenter si vaillamment! Or, en fait d'art, l'Amérique est encore, je crois, dans une période de tâtonnements, cherchant sa voie. Comme l'abeille, elle butine un peu partout, dans tous les pays du monde, pour faire plus tard son miel. Ce miel sera assurément exquis; de plus heureux que nous pourrons y goûter dans l'avenir. On ira alors aux Etats-Unis étudier les merveilles d'un art jeune et nouveau, comme on vient en Europe s'inspirer des arts du passé. Ce n'est peut-être pas un rêve que je fais là, Messieurs. Hélas! tout change, rien ne dure! Je ne dirai pas tout meurt, car l'Art et le Beau sont immortels! Je termine, Messieurs, en vous disant combien je suis heureux d'avoir pu en ce jour me faire l'interprète de la Société Centrale des Architectes Français, en saluant dans mon éminent confrère, M. Richard Hunt, un des plus illustres représentants de l'Art aux Etats-Unis d'Amérique.

The President having congratulated the Institute upon having so auspiciously concluded its session, the company adjourned to the lower galleries, where light refreshments were provided, and the Meister Orchestra performed some selections of music.

FROM THE MEXICAN NATIONAL MUSEUM.



Outlines of Brantz Mayer's Illustration of the "Fainting Stone."

Chalchiuhtlicue, the Goddess of Water.

IN the field of Mexican archæology, if we in this country have heard much of the work of the Le Plongeons, of Biart, of Charnay, of Bandelier and of others representing the scientific spirit of other nations, and scarcely anything of work done by Mexicans themselves it, is, nevertheless, neither a safe nor a just inference, to presume that Mexico has no savants or that her men of science have been neglectful of this field. The list of native scholars who have devoted attention to the antiquities of Mexico is a long one and includes the names of Alfredo Chavero, Mariano Barcena, Garcia Cubas, Troncoso, José Icazbalceta, Dr. Peñafiel, Orosco y Berra and others who have worked industriously, intelligently and with admirable results. Of late years the Mexican government has given great encouragement to the conservation of the monuments of the past ages, by inhibiting their exportation and by asserting the right of eminent ownership over every new discovery. It has further sought to encourage the study of archæology by means of the collection of relics known as the *Museo Nacional*.

The history of this collection properly begins with an incident which was the reverse of propitious. It is already so well known as scarcely to require repetition here, that Fray Juan Zumarraga, the zealous ecclesiastic who was first placed at the head of the Mexican hierarchy, sought to efface every relic of the heathenism he had been sent to destroy. Idols, temples and valuable picture-writings were all destroyed without regard to their historical value. Such as were combustible were burned. The others were buried out of sight. Subsequently another archbishop pursued the same mistaken policy in the early years of the seventeenth century. The Spanish kings, however, were disposed to preserve all documents that might throw light upon American history, and made it the duty of their Viceroys in Mexico to seek out, collect and care for all such relics. The documents thus brought together and added to the viceregal archives included the rich collection made by Don Lorenzo Boterini Benaduci, confiscated by the government in 1744. Before 1773 this collection had been largely dispersed. In that year the Viceroy, Don

Antonio Maria de Bucareli y Ursua, one of the most distinguished benefactors of Mexico, sought to check the destruction of this valuable historical matter by ordering its removal from the place of the viceregal archives to the Royal University, the building now occupied by the Conservatory of Music.


The so-called War God "Huitzilopochtli," otherwise "Coatlicue."


The so-called "Chac-Mool."


Sculptured Disc formerly used in the Game of Pelote.

The year 1790 was marked by the recovery of several ancient monoliths from beneath the surface of the Plaza Mayor of the City of Mexico, where, presumably, they had been buried by the orders of Zumarraga. The Count of Revillagigedo, then Viceroy, directed that these be added to the collection at the University. The so-called "Calendar Stone," however, was, by the special request of the Commissioners of the Cathedral Building placed in the base of the southwestern tower of that edifice.

In 1822, Iturbide, then in the midst of his brief imperial career, established in the University, a "Conservatory of Antiquities and a Cabinet of Natural History." It is not strange that the subsequent government of Mexico, in which Don Lucas Alaman, the distinguished historian, was so prominent a figure, should take an interest in this subject. It was in accordance with Alaman's suggestions that the Conservatory and the Cabinet were combined and reformed as the National Museum of Mexico.

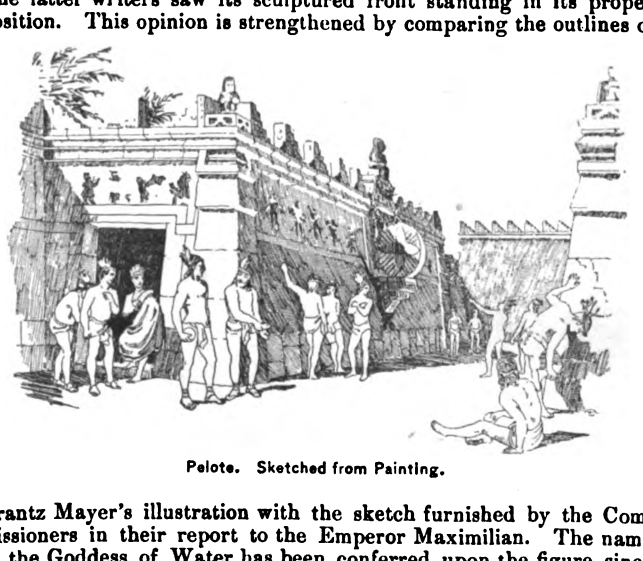
The Second Empire with its infusion of European ideas, was especially calculated to encourage the collection and study of the historical and archæological monuments of the country. In 1864, the Emperor Maximilian appointed a Mexican Scientific Commission and sent it to explore various localities where such monuments were likely to be found and to collect such as were readily movable. In 1865 he had the entire collection removed from the University Building to an apartment in the National Palace, then just vacated by the Mint. He was the means of having the "Shield of Montezuma" (which had been retained since 1530 in the Royal Museum in Vienna) restored to Mexico. After the fall of the Second Empire, the National Library was separated from the Museum and housed in the confiscated Monastery of San Agustin. The restored Republic assumed the support of the Museum — placing the sum of $500 annually at the disposal of the Director, to be expended at his discretion. The sum has since been doubled though still absurdly inadequate.

In 1884, Mr. W. W. Blake, an American resident of Mexico, prepared a complete catalogue of the Museum, the first attempt ever made to give English-speaking visitors an intelligent knowledge of the collection of antiquities to be found therein. But scarcely had the little book made its appearance (a paper-covered 24mo of 119 pages), when the whole collection was rearranged and additions were made thereto. Mr. Blake, however, watched the changes taking place in it, and in 1891 published a revised catalogue, under the title, "The Antiquities of Mexico, as illustrated by the Archæological Collections in its National Museum." This pamphlet of ninety-two pages, profusely illustrated, is restricted to the archæological department of the Museum, assuming that the Historical and Natural History departments are sufficiently self-explanatory to the interested visitor.

In the archæological collection are comprised the monoliths, pottery and paintings produced by the native races prior to the Conquest. Of the greatest architectural interest are the sculptured monoliths. They exhibit the extent of the art of design among the native races, their manner of working stone and their ability to transport immense weights considerable distances without the aid of draught animals. Fortunately these monoliths are well arranged in a lower hall. It is only recently that the proper designations have been given to some of the most notable of these, while it is still a matter of speculation as to what others represented to their former possessors. The so-called "Aztec Calendar Stone," "Sacrificial Stone" and "War-god Huitzilopochtli," have been heretofore pictured in the *American Architect* (No. 638), and have been elsewhere so frequently commented upon as to be already familiar to the reader. The proper name for the curious figure unearthed by Dr. A. Le Plongeon at Chichen-Itza in 1877, and named by him "Chac-Mool" ("the Tiger King"), is still in dispute among scientists. Pending the settlement of the dispute, however, the statue continues to be known as "Chac-Mool" and to be one of the striking features of the collection of monoliths.

Among objects of interest less known than those already mentioned, the huge stones composing the Toltec column, brought from the plaza of Tula in 1885 are worthy of special mention. These stones are five pieces of dark basalt, so mortised and tenoned as to be fitted together into a column, pilaster or caryatid, whose base consists of a huge pair of feet and whose capital is an enormous vase. Three sides of these stones are sculptured and the back is left unadorned, indicating that the rear of the column was set against or into a wall. The column furthermore implies a greater height for the Tula building than is the supposed height of any structure among the Aztecs excepting the pyramidal temples; and that the Toltec buildings were similar in character to those of Mayapan, Chichen-Itza and Mitla.

In a monolith ten and a half feet in height and five and a half feet square at the base, removed from San Juan de Teotihuacan in 1890, and now going by the name of Chalchiuhtlicue, the Goddess of Water, are amusingly illustrated errors into which archæologists in Mexico have fallen. Early in this century several writers made mention of a certain stone lying at the base of one of the tumuli near the Pyramid of the Moon in Teotihuacan. Brantz Mayer described it, not only in words but also by means of a drawing, and stated that he had heard that whoever would sit or recline upon it would immediately be seized with a fainting fit. All this while the stone was lying with the side pictured by Mayer upward. Since 1884 no further mention has been made of the fainting stone by visitors to Teotihuacan. In that year a commission sent by the Emperor Maximilian to inspect and report upon the ruins at Teotihuacan, reported the discovery of a monolith lying with its face buried in the earth, which, upon being raised and set upon its feet proved to have a sculptured face, though resembling in other respects a Ninevite column. Subsequent writers have referred to the presence in Teotihuacan of a huge altar or pillar of a temple. A correspondent of the *American Architect* pictured the stone, its base buried in rubbish, as it appeared in 1883. (See No. 415.) It has only recently been suggested that the "Fainting Stone" mentioned by writers prior to 1864 and the sculptured figure mentioned by those since, are identical, both being described as located in the same spot. The earlier writers saw the back of it and pictured or described it as reversed or standing on its head. The latter writers saw its sculptured front standing in its proper position. This opinion is strengthened by comparing the outlines of Brantz Mayer's illustration with the sketch furnished by the Commissioners in their report to the Emperor Maximilian. The name of the Goddess of Water has been conferred upon the figure since its removal to the Museum.

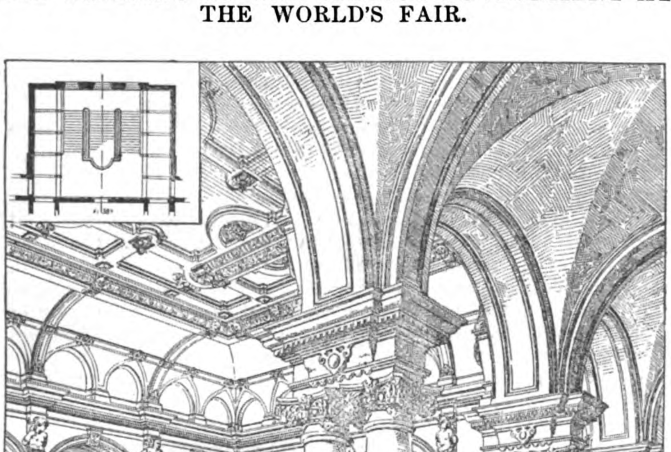

Pelote. Sketched from Painting.

Certain stone discs in the south room of the Museum appear to have escaped the notice of visitors, no mention of them being made in the published works on Mexico. These discs held an important

place in the ancient game of *pelote*, answering among the aborigines to the great national game of base ball with us. The discs are about three feet in diameter and each has a round hole in the centre. With slight variations the game was played by the Mexicans, the Acolhuans, and the Maya-Qquiches. The ball was of rubber, the players were nude with the exception of the breech-cloth and the game was played in a court-yard having high stone walls. In the Acolhuan game the ball once put in motion was only to be touched by the naked thighs or shoulders of the players. The disk was the distinctive feature of the Maya-Qquiche game. The skill of the players was exerted to send the ball through the hole in the disk, which was fastened into the side wall of the court. The game of *pelote* has been made the subject of a painting by a Mexican artist who has a penchant for archæological subjects.

Not to extend this paper further by specific descriptions of other objects, let these already mentioned serve to exhibit the skill of the aborigines in the art of sculpture. They certainly justify Bandelier's criticism in "*An Archæological Reconnaissance into Mexico*" (p. 77). "I have already alluded," he says, "to the imperfections of aboriginal art in Mexico. While many of the faces and heads are well done, particularly those in clay, this excellence very rarely, if ever, extends to the other parts of the body. On the contrary, there is always a certain disproportion and consequent lack of harmony. The Chac-Mool, which (excepting, perhaps, the Indio Triste) is the best of all, still shows strange defects in the proportion of its lower limbs. The same is true in regard to the figures of animals. Quadrupeds are mostly rude in shape; still I have seen more than one head of a tiger which is fairly executed. Birds are always monsters, the workmen being unable to overcome the difficulty of rendering the plumage; but all simple forms, like snakes, turtles, frogs and reptiles generally, seem to be well imitated. Thus the head, coils and rattles of the rattlesnake are excellent. Fishes are poorly represented; and plants, which rarely occur except as leaves and single flowers, are mostly of stiff conventional types. The art of sculpture in aboriginal Mexico, while considerably above that of the Northern Village-Indians, is still not superior to the remarkable carvings on ivory and wood of the tribes of the northwest coast, and often bears a marked resemblance to them." ARTHUR HOWARD NOLL.

THE BUILDING OF THE SPANISH GOVERNMENT AT THE WORLD'S FAIR.



Staircase in the Courts of Justice, Cologne. From *Architektonische Rundschau.*

THE significance that the Columbian Exposition has for Spain, not only in that it institutes a comparison between the Old and the New World, but also on the account that it commemorates one of the most glorious pages of her history, has been the cause that the Spanish Government has selected as the theme of composition for the Spanish Pavilion a building which can characterize the epoch, and the people that knew and contributed to the glory that is here commemorated.

The Exhibition taking place here in a large country of free institutions, amid people so progressive as the North Americans are, it was opportune and proper to select a civil edifice of the epoch and date that we commemorate, giving in this way to the study of the observer not only a visible sample of the condition of Spanish art in general at that historic moment but also a manifestation of the public spirit, free institutions, progress, richness and power of the nation that could give and gave, language, laws and customs, to the greatest part of the American Continent.

The Spanish nation on the other hand, being conscious of its relation in this glorious success, which is being commemorated and which gave motive to this Exhibition, could not come and take part only with an economical point-of-view; it was necessary for Spain to have an ideal to support the moral and philosophical part so as to characterize its presence in this competition. To find an ideal was not difficult, as it was only necessary to select from amongst the innumerable monuments, which, as stone pages, illustrate the History of our Fatherland, the one which could best characterize this Historic Moment of the Nation of the Great Queen.

Of all this great number of buildings, La Casa Lonja de la Seda Valencia (or the Silk Exchange), for what it is, for its noble treatment, its grandeur and its æsthetic value, characterizes the Nation and the people that erected it. "The man makes the home, the home makes the man." And not only this building characterizes by its tangible forms the manner of the country which erected it, but also its destination as a general house of transaction, (silk was a principle article of exchange in the agricultural and industrial trade, one being complementary of the other), and the way taken to accumulate the elements necessary to complete its construction, show the powerful and practical strength of this country, as can be seen by its structure, and principally in the moral worked upon the frieze, where can be read at the level of the caps of the Main Columns Hall: "Famous house I am, in fifteen years erected. Compatriots! Look and prove how good is the merchant who does not carry the fraud in the word, which promises to the other and proves true. Who do not give their money with usury. The merchant who lives in this way, will grow with richness, and enjoy eternal life."

DESCRIPTION OF THE SPANISH PAVILION.

The portion of the Casa Lonja of Valencia erected in Jackson Park, taken from model, shows only two parts of the original building, the Column Hall and the Tower; the other part, called "Consulate," has been omitted because the architecture is decidedly of the Renaissance style; these two parts are reduced in proportion to three-fourths of the original. The reason for this was as follows: Every architect of experience, who carefully studies the original structure, will notice that the building was projected on the idea of erecting only the said Column Hall and the Tower, and it was erected in this way at first, that is in 1482, in which year the vaults were completed. This conviction is based principally on the fact that a complete separation exists between the ashlar of the tower and the third part of the building called the "Consulate." The separation is a vertical joint without break, continuing from bottom to top between the tower and the Consulate, hence there not only exists an historic reason in the difference of style, which is very significant, but also a material fact and evident reason in this dis-continuation of the ashlar, which has no other explanation than that the other part of the building, called the "Consulate," was an addition, not taken into consideration in the first project; it was an entirely new idea outside of the first one and of a later date. Taking these facts into consideration, the Spanish Government decided to take as a theme for the Spanish Pavillion here the portion of the Casa Lonja of Valencia that was erected, without any doubt, before the date of the discovery of America, that is the said Column Hall and the Tower. But we found that the ground granted by the World's Fair Commission to the Spanish Government was too small even for these two parts of the building, and consequently, we were obliged to reduce the building here, to three-fourths the size of the original building in Spain; hence the Chicago building measures 84 feet 6 inches, instead of 112 feet and 8 inches, the measure of the original in Spain, including the tower in both instances.

In Column Hall the space is distributed, as in the original, in three naves longitudinally, and five naves transversely, corresponding to eight columns or pillars in the centre, with corresponding halves and quarters in the lateral walls and corners, forming in all fifteen vaults. The columns are of the same form as the originals, and are 2½ feet in diameter and 28 feet high (or 8m. 40). These columns are composed of eight colonnettes separated by fillets and scotias, and, as in the originals, constructed and developed in spiral form. Each colonnette has its corresponding base penetrating the base of the pillar. In the upper part, these colonnettes end in the general caps of the pilaster, and die away into the members of the ribs that form the construction of the vaults. The principal ribs have their origin in the drums of the bosses. The other ribs, or the secondary ribs, cross from one to the other and they end in the drums of the bosses.

The capitals have the same character and form as the original, and consist in a thin impost without any ornament; beneath this and filling each one of the scotias, is a plain ornament representing a kind of braid of silk. The ornaments of the rosettes represent

the four antique branches: the Church, Magistracy, Military and Artisan trades, also the Agricultural, Commercial and Industrial. The hall receives its light by five large bentnals [*sic*], four doors and two windows over the line of the frieze.

In the interior can be seen the beautiful doors from main hall to the tower, and the door from the same hall to the spiral stairs. All the tower floors are destined for the staff of the Royal Commission, and connect with one another by a stair we call the principle stair.

The construction of the building is of wood, covered with "staff," which gives the appearance of solid stone, resembling the original building, and the walls are hollow, so as to have the proportionate thickness of the walls of the original in Spain.

As we had to build this building three-fourths the size of the original, it was necessary to draw full-size windows, doors, pinnacles, jambs, bases, caps, archivolts, carvings, coats-of-arms, etc., for the interior and for the exterior, in order to have the models for the new castings made in the right proportion. These drawings were so much the more necessary that we did not have any genuine drawings from the original, but only small photographs from which had to be deduced the jambs and cornice sections; we also had a few engravings and some casts from Spain, and finally the intuition born of the knowledge that the subscriber has of his country's method of building, and the great desire, if not the sufficient intelligence, to do justice and homage to the work of a compatriot. But, there are exhibited as vouchers, for any insufficiency of composition, or want of right execution, the castings from the original, received from Valencia, Spain; honoring in this way, the memory and the work of one of the classic architects of that Golden Epoch of the Architectural Art, in which the architect was the contractor of his own conception, and the contractor his own architect, as was the case of Pedro Compto, Architect, Builder and Stone-cutter of the Casa Lonja de Valencia.

R. GUASTAVINO.

THE OLD SORBONNE ABOUT TO DISAPPEAR.

THE old Sorbonne, which is already bounded on three sides by new buildings, is about to disappear, with the exception of the chapel, where Cardinal Richelieu is buried, and where his head, cut off and carried away by the Jacobins in 1793, was replaced in 1867. The materials were sold lately, so European journals announce, and the front and quadrangle, erected in the reign of Louis XIII, will speedily be demolished. There have been, it would appear, but a few faint protests against this demolition of the halls associated with Victor Cousin, Villemain and Geoffroy Saint-Hilaire.

This ancient and famed institution is situated in the Faubourg Saint-Germain, between the Musée de Cluny and the Panthéon, to the east of the Boulevard Saint-Michael. The original building, founded under Louis V (St. Louis) in 1253 by Robert de Sorbon, his chaplain, was rebuilt in 1629 by Jacques le Mercier, under orders from Richelieu. The intention of the founder was to bring together a society of secular ecclesiastics who should live in common, who should have no other thought but study, and who should give instruction gratuitously. The school at once took the name of the *Pauvre Maison*, and the masters were called *pauperi magistri*. Letters patent establishing the foundation were granted by the King in 1255, and four years later the Pope, Alexander IV, confirmed these by a brief, which bore the title "*Congrégation des Pauvre Maîtres de la Sorbonne.*"

From the earliest times the Sorbonne was known as a theological college. Theology and the Sorbonne, until the end of the last century, were synonymous. From its humble beginnings it quickly became the chief institution of scholastic theology, which promulgated its opinions in such an *ex cathedrâ* manner that it not unfrequently opposed the spiritual authority of the Pope. Its influence on the Catholic Church has been for many centuries paramount. The teaching of the Sorbonne was hostile to the Reformation, and had much to do with the persecutions of the Huguenots. In the same way it has always been opposed to the Jesuits, while, on the other hand, it rejected the Papal bull launched in 1713 against the Jansenists. The masters of the Sorbonne, who were at first poor and modest in their acquirements, became headstrong, despotic and fierce against the progress of human learning. Such was the actuating spirit that guided the Sorbonne until the Revolution; its statutes were the same in 1790 as in 1290.

A chronicler of the reign of Henri III (1574-89) speaks of the Sorbonne as "thirty or forty pedants, besotted masters of arts." Half a century earlier the Faculty of Theology forbade the translations from Latin into French of "*Les heures de Notre Dame.*" It was far from approving of the translation already made from the Bible and other books; the Holy Scriptures had been written and sanctioned in the Latin language, and in that language they ought to remain. But at the same time, it must also be remembered that to the Sorbonne belongs the glory of having established within its walls the first printing-press known in Paris. This was about the year 1470. A hundred and fifty years later the Sorbonne possessed one of the finest libraries in Paris.

As already said, the object of the Sorbonne was to develop the importance of theological studies. The college has always formed a part of the University of Paris, but the connecting link between the two institutions gradually grew to be less firm. The congregation, that is the college, had at its head a *proviseur*, who had under his orders a *prieur*, intrusted with the general discipline of the place; there were four *docteurs*, who saw that the statutes were properly observed, and there were several *procureurs*, to whose care was given the particular administration and the provisioning. Lectures were given, professorships were founded, and degrees of bachelors and of doctors were looked upon as marks of earthly glory.

Every graduate was called a Sorbonniste, and degrees were not conferred until after long and very arduous preparation. The *thèse Sorbonnique*, which every aspirant to a doctor's honor had to pronounce before the collected assembly, was considered as the greatest effort of human intelligence. It began at six o'clock in the morning and lasted until six in the evening. During the Revolution the Sorbonne was suppressed, but in 1808, when Napoleon founded the University of Paris, the old college was handed over to the university, the Emperor incorporating the Chair of Theology in the system of education of France. By a royal decree passed in 1821, the Sorbonne was henceforward to be used for the purpose of public instruction, and within its walls were established the Faculties of Theology, of Letters and of Sciences. It was ordained that public lectures should be given upon these subjects, and now the Sorbonne is the headquarters of the Academical University of Paris. Some of the professors of the Sorbonne have made for themselves a reputation by their lectures, but, as a rule, the lectures are not printed after they are delivered. Men of note and high ability are always selected, and the post is one which carries with it a certain distinction.

For some years past the Sorbonne has been undergoing great changes, as it has been necessary to enlarge the buildings. The older part of them, which is entered by the Rue de la Sorbonne, that erected by le Mercier, contains, on the rez-de-chaussée, an amphitheatre which holds 1,500 people. The library contains 170,000 volumes. Above the entrance which leads to the vast room wherein are stored the books bequeathed by him to the Sorbonne, together with his collection of autographs, is a large marble medallion of the testator by Carrier-Belleuse. On the first floor is the famous amphitheatre, which can accommodate 2,000 persons, and wherein are held the great meetings of the university, such as the one which takes place yearly on the occasion of the distribution of the prizes won at the *concours général*, or general competition among the lycées and colleges of Paris and the Lycée of Versailles.

Close by, in the *place* of the same name, is the Church of la Sorbonne, which, first built in the thirteenth century, was rebuilt from 1635 to 1659 by le Mercier at the expense of Cardinal de Richelieu. Its dome is really the first erected in Paris, for the cupolas of the Église des Carmes and of Saint-Paul-Saint-Louis represent merely timid attempts at such architecture. Within its walls is the tomb of Cardinal de Richelieu by the sculptor Girardon, after drawings by Lebrun. — *New York Times.*

SOCIETIES

ENGINEERS' CLUB OF PHILADELPHIA.

AT the business meeting June 17, 1893, Mr. C. H. Roney opened a verbal discussion on some data in reference to modern office-buildings, by calling attention to the rapid changes which had taken place in the construction of buildings in this class within comparatively a few years. Formerly they were built like dwellings, and of not more than five or six stories, but now the introduction of elevators has been followed by an increase in height to an average of twice the above number of stories. All parts of the construction are made as fireproof as possible, wood being used only where nothing else can be substituted for it. Methods of supporting the floors, and bracing to withstand wind-pressure, were described and illustrated by blue-prints of typical buildings in Chicago and Philadelphia. In some cases the columns of successive stories support one another, and in others are made practically continuous. A model of the Phœnix column, showing the latter method, was presented as an illustration. Other details of construction were described by Mr. Roney, and in conclusion a series of photographs were projected by the lantern, giving typical examples of modern office-buildings in various stages of completion.

Mr. Howard Constable inquired of Mr. Roney whether he had formed any opinion as to what was the practical deviation from the vertical allowable in the erection of the main columns of high buildings and framework of elevator shaft.

Mr. Constable's opinion, in a special case, was that one and one-half inches in 200 feet was too much in an elevator shaft to be passed as first-class work, and not within the limit of what should be allowed for general practice. He called attention to the fact that this was a point upon which engineers would have to post themselves, as it bears an important relation to disputes between the structural contractors, the stair-builders and elevator people. These disputes arise from the pressure that is brought to bear to complete these buildings in a very short period; therefore, the rapid getting-in of stairs and elevators becomes very important, although very little of the work is got out until measurements from the building can be taken, — the manufacturers of these parts generally finding it very unsafe to work from drawings, and feeling no certainty as to what the deviation on the part of the other mechanics will be.

He also called attention to the fact that as yet, very little attention is given by the architect and structural engineer to providing for the various pipe-systems necessary in all high buildings. He thought they ought to be planned for as carefully as many other parts, and showed how the putting-in of gas, steam and electric piping, etc., very seriously weakens some beams in the floor-arching or the wall, also that the ordinary hollow tile for the floor-arches is peculiarly ill adapted for being cut through for piping.

In answer to a question from Mr. James Christie regarding the corrosion of iron buildings from the effect of the dampness in the brick and mortar, he said he had found no case where any iron section resisting a strain was injured over one-half per cent of its effective section, but that where columns are used for leaders, or where there are pockets where water can collect and remain, the corrosion might be very serious.

Mr. Christie called attention to the probable inadequacy of the transverse bracing on many high metallic buildings. For thin floors, substantial metallic plates of corrugated section are now used, having ample stiffness, with total vertical depth not exceeding one-thirtieth of the span, and the weight of metal in the floor can be safely reduced to fifteen pounds per square foot.

There was then a general discussion between the members as to the ordinary straight arch-tile for the floors.

Mr. Constable took exception to the circle formed by the radius of arch-blocks being considered as representing the line of force in the arch, first, because a circular arc does not represent the line of pressure in the arch, and second, because the radius and bevel of these blocks is an assumption by the manufacturers for some special span, and is not varied to suit every span, additional blocks simply being added for increase of span. A simple rule for approximating the strength of these arches is to consider the load as concentrated in the middle, and to represent it graphically by the efficient depth of the block, and then to find what would be the resultant from the top of the arch down to the springing-line where the arch-block bears against the iron beam. Then if there is enough cross-section of material to resist this resultant, the arch will stand.

Mr. Henrik V. Loss stated that the existing friction between the surfaces in action, undoubtedly made the arch act partly as a bearer, by preventing or offering resistance to any sliding action that otherwise would occur with joint lines and theoretically correct.

Mr. John C. Trautwine, Jr., described a fireproof floor designed by E. D. Lindsey, of New York, consisting of a wire netting suspended over two adjoining floor-beams, and encased in a mass of light concrete containing plaster-of-Paris and saw-dust.

Mr. Constable called attention to the very important consideration in all of the tile and concrete floors, of the effect of concentrated weight, such as is caused by a heavy safe resting on four wheels. (Mr. Trautwine suggests by letter that this difficulty might be obviated by placing under the safe an iron plate sufficiently large to receive all four feet and thus distribute the weight).

Mr. Constable illustrated a floor that he had recently used consisting of a series of arch-bars interlaced together and butting against a frame extension around the room. The triangular space between these bars was filled-in by pressing an air-bag up from the other side, and casting a plaster-of-Paris arch over the bag, and when the plaster was set, removing the bag; then on top of these bars and plastered arches filling-in with ribs of fine concrete and then putting on the wooden or mosaic floor. He stated that he had got better results in ordinary brick arches, between beams, by placing the tie-rods close at the bottom flange of the beam instead of half-way up, as is usual.

Mr. Trautwine brought before the Club a question respecting the position of the line-of-pressure in a flat arch consisting of a keystone, two blocks with parallel sides adjoining the key-stone, and two end blocks between these last and the beams. One member, A, maintains that the line of pressure may be found by producing the sides of the keystone to meet in a line below the arch, and by drawing from a point in this line, as a centre, two circular arcs from the top and bottom respectively of the bearing of the arch upon the beams. Another member, B, maintains that the position of the line-of-pressure must be found by the usual method of statics, and is entirely independent of such geometrical considerations, as is shown by the fact that we might as well find our centre by producing the parallel sides of the next two blocks.

Mr. John L. Gill, Jr., supported A's position, drawing a more nearly correct sketch of the construction, and further criticised the character of the materials used, and the manner of putting them together.

Mr. Constable claimed that B was right, pointing out that the line-of-pressure in an arch is not in any case a circular arc.

Mr. H. C. Luders held that the line-of-pressure must pass through the extrados at the centre and through the intrados at the skew-backs.

L. F. RONDINELLA, *Secretary.*

CHICAGO ARCHITECTURAL SKETCH-CLUB.

CHICAGO, ILL., June 26, 1893.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—I enclose the programme for the "Robert Clarke" Competition for this year, together with a drawing from which to make cut.

I will consider it a favor if you will find space for this in your next publication.

Very truly, HUGH M. G. GARDEN, *Secretary.*

FIFTH ANNUAL COMPETITION FOR THE ROBERT CLARKE TESTIMONIAL.

CONDITIONS.

The author of each design must execute all drawings without assistance, and non-adherence to these conditions will cause the rejection of the design or designs in question.

The competition is open to architectural draughtsmen under thirty years of age, residents of the United States and not practising architects.

The awards will be made by the Adjudicating Committee on the "Robert Clarke Testimonial" competition, and are:

First prize, ...	Gold medal.
Second prize, ...	Silver medal.
Third prize, ...	Bronze medal.

The prize drawings are to become the property of the Chicago Architectural Sketch-club.

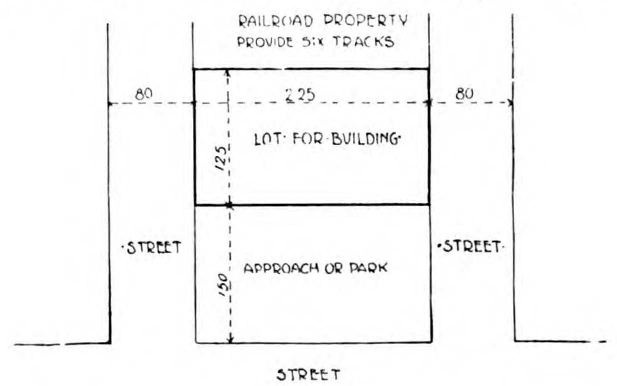
PROGRAMME.

A design for an elevated railroad terminal station for suburban traffic, in the business centre of a large city.

The building is to have three general stories, the first or ground floor to contain a lobby, stairways, offices and all necessary conveniences.

The second floor is to be on a level with the platform and to contain one general waiting-room, one waiting-room for women and one for men, toilet-rooms, ticket-office, depot-master's office and necessary stairway to reach the Railroad Co.'s offices on the third floor.

The building can be smaller than the lot outlined on the accompanying diagram, and the space in front is to be used as an approach or park.



PLAN·OF SITE·

The drawings are to consist of the following, their arrangement and the number of sheets being left to the discretion of the competitor:

First or ground floor plan, second-floor plan, front and side elevations, transverse or longitudinal section, perspective and block plan.

Size of sheets to be 22 x 28 inches.

Plans, elevations and section to be drawn to a scale of 1-16 of an inch to a foot, pen and India ink rendering. The perspective to be drawn from an 1-8 scale plan, rendering optional.

The drawings are to be marked with a motto or *nom de plume*, and accompanied by a sealed envelope marked in the same manner, containing the name and full address of the author, with the place and date of birth, and must be delivered flat to Hugh M. G. Garden, Secretary, Chicago Architectural Sketch-club, at the Club Rooms, 913 Masonic Temple Building, Chicago, on or before Monday, October 2, 1893. Charges to be prepaid. All drawings other than those receiving prizes will be returned at the expense of the contributor.

The Adjudicating Committee on the Robert Clarke Testimonial:
W. L. B. JENNEY, *Chairman.*
SAMUEL A. TREAT.
CHAS. A. COOLIDGE.
D. H. BURNHAM.
LORADO TAFT.

THE ILLUSTRATIONS

[*Contributors are requested to send with their drawings, plans and a full and adequate description of the buildings, including a statement of cost.*]

COTTAGE ON LEHMANN ST., GERMANTOWN, PA. MR. WILSON EYRE, JR., ARCHITECT, PHILADELPHIA, PA.

[Gelatine Print issued with the International and Imperial Editions only.]

HOUSE FOR C. E. BILLINGS, ESQ., HARTFORD, CONN. MESSRS. COOK, HAPGOOD & CO., ARCHITECTS, HARTFORD, CONN.

THE BUILDING OF THE SPANISH GOVERNMENT AT THE WORLD'S FAIR, CHICAGO, ILL.

FOR description see article elsewhere in this issue.

DETAILS OF THE SAME.

THE LONJA, VALENCIA, SPAIN.

THE OLD SWEDES CHURCH, SOUTHWARK, PHILADELPHIA, PA.

WICACO or Gloria dei Church was erected in 1699 on the site of a block-house which was used as a place of religious worship by a small colony of Swedes, nearly half a century before William Penn set foot on the soil of Pennsylvania. It contains a baptismal font said to have been brought to this country by the early colonists, and used in the block-house mentioned. The bell in use at present was made from the material of the old bell, dated 1643. It bears the inscription:

> "I to the church the living call
> And to the grave do summon all."

The oldest stone in the yard is dated April 21, 1708, and among the most interesting is that which covers the remains of Alexander Wilson, author of "*American Ornithology*."

[Additional Illustrations in the International Edition.]

THE LELAND STANFORD, JR., UNIVERSITY, PALO ALTO, CAL. MESSRS. SHEPLEY, RUTAN & COOLIDGE, ARCHITECTS, BOSTON, MASS.

[Quadruple-page Copper-plate Etching.]

THE general plan of the University consists of a series of rectangles, the longer axes of which follow the general trend of the valley in which the University is situated. The approach is through a broad avenue about a mile and a quarter in length, from the county road running between Menlo Park and Mayfield. On either side of the avenue are groves of trees up to a point at which a view is obtained of the whole front of the University. The frontage of the University on the avenue is about two-thirds of a mile in extent, being flanked on either side by the large domitories respectively for girls and boys. Immediately in the centre is the grand memorial arch forming the entrance to the principal quadrangle. The frieze of this arch is intended to typify emblematically the progress of civilization. On either side of this arch are the buildings for the use of the libraries and museums.

The main quadrangle, 586 feet by 246 feet in the clear, enclosing about three and one-quarter acres, is surrounded by one story buildings opening on a covered arcade. The motive of the design was taken from the old Spanish missions in California.

Immediately opposite the entrance arch is the chapel with the central tower rising to a height of about 130 feet and forming the principal feature of the quadrangle.

East and west of the main quadrangle the grounds have been laid out for two quadrangles, making five in all, the smaller quadrangles to be used for the future growth of the University.

At the rear of the principal quadrangle are located the boiler-house, power-house, work-shops for the mechanical department, etc. The principal quadrangle is entirely surrounded by two sets of buildings, all of which are connected together by cross arcades so that a person may pass from one to the other without going from under cover. The arcades are 18 feet wide and are paved with artificial stone laid in squares.

The buildings are all of a gray sandstone varying in color from a white, through yellow, to a red, and the face of the stone is left rough. The roofs are of red Spanish tile unbroken by any dormers or other windows. The scheme of the buildings has been to leave them in condition to divide by partitions in any manner desired, only the exterior walls and roofs being entirely permanent.

The large dormitory for the boys is at the east end of the frontage and is 312 feet long by 172 feet deep, furnishing accommodations for over three hundred students. The dining-hall has a seating capacity of 350 and is furnished in white cedar and opens directly from the entrance lobby. The sleeping-rooms are arranged with alcoves which are curtained off from the rooms, and in almost all cases are intended for two occupants.

[The non-appearance of the dormitory, which should be shown in the space in the upper right hand part of the plate, is due to a series of misunderstandings. While the plate was being etched in Paris Senator Stanford chanced to see it and stated that the design of the dormitory had been materially changed and asked that work on the plate should be stopped. On being notified of this stoppage we procured from the architect a sketch of the revised design and forwarded it to Paris. Apparently the sketch miscarried in transit and the artist hearing nothing from us and weary of waiting — more than a year — finished the plate and forwarded the prints. EDS.]

THE HALL OF THE COTTAGE, WALTON HEATH, SURREY, ENG. MR. B. VAUGHAN JOHNSON, M. A., ARCHITECT.

AN exterior view and plan of this building has already been published in *The American Architect.*

WURTZBURG.

MARQUIS OF GRANBY PUBLIC-HOUSE, SHOPS AND RESIDENTIAL SUITES AND STABLING, LONDON, ENG.

THE block of buildings, as illustrated, covers an area of 7,000 superficial feet, and the accompanying plan will best show the general arrangements. The stable plan has been very carefully considered, and by means of two entrances (in Down Street and Brick Street) from different levels three floors have been utilized, without necessitating any steep gradients for the horses. Haylofts, harness-rooms and accommodations for the men have been arranged over the stables, which are well ventilated and lighted throughout. The Marquis of Granby public-house covers the exact site of the old house, and the bar fittings and other joiner's work are executed in walnut, panelled and enriched, of a handsome character. The shops in Down Street are constructed to let with basements, and the upper floors contain bachelors' suites. The elevations are carried out in red brick, with stone dressings and granite pilasters to ground floor. Messrs. Martin & Purchase, of 11 Queen Victoria Street, E. C., were the architects for the stabling, shops, chambers etc; and Messrs. Boehmer & Gibbs, of 11 Spring Gardens, S. W., superintended the erection of the Marquis of Granby public-house.

COMMUNICATIONS

[*The editors cannot pay attention to demands of correspondents who forget to give their names and addresses as guaranty of good faith; nor do they hold themselves responsible for opinions expressed by their correspondents.*]

PARTY-WALL FOUNDATIONS IN CHICAGO.

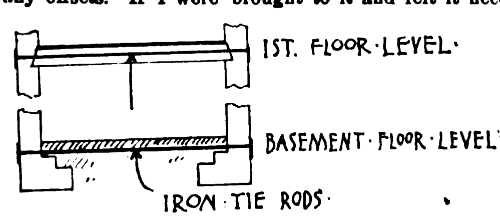
CHICAGO, ILL., June 16, 1893.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Relative to the spread of footing-stones under foundation-walls which abut directly on adjoining property, I find the *Engineering Record* of the date you mention, to be out of print. Will you briefly explain the principle of footing-stones under such walls, showing how they are placed to avoid tilting up?

Yours respectfully, F. F. D.

[ON referring this question to a Chicago architect we have received the following reply: "As far as my experience and observation goes, there is but one absolutely safe method of putting in line wall [footings], and that is to carry the walls by a cantilever from the interior of building [and therefore practically have no footings!] This method is, of course, extremely expensive, but was satisfactorily used by Messrs. Burnham & Root in the Rand & McNally Building. Fortunately, in Chicago we are rarely forced to any such expense, for the Illinois law compels every owner to take care of his own property, no matter how much an adjoining owner may dig under existing walls (and consequently endanger the old building). As a result, compromise is generally brought about by which the party building agrees to hold up the old adjoining building on jack-screws, in return for which footings are permitted to extend onto adjoining land. Occasionally, as a makeshift, piles are driven very near together, which with their heavy carrying power will permit of a moderate wall without any offsets. If I were brought to it and felt it necessary to build line walls. I should carry out a scheme, once studied out, which I think would be fairly successful, provided the building was not an extremely wide one and it was not feasible to use cantilevers on account of expense. As shown by adjoining little sketch, I should build both walls alike, expecting them to both have a tendency to tip out, which would be counteracted by numerous tie-rods both below basement floor and also at the first-floor level, in which case the two tipping forces would counterbalance each other and establish an equilibrium. All of which theory is probably not to the point in question. The cantilever construction, if I remember correctly, was described in some of the engineering papers at that time, but I have no files to refer to that I may give dates." — EDS. AMERICAN ARCHITECT.]



OFFICE-HELP: A CORRECTION AND REPLY.

MILWAUKEE, WIS., June 29, 1893.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Referring to the article "Office-help for Architects," by Mr. George Hill, in your issue of June 3d, I wish to call attention to the section relating to wood-girders.

Formula 34 is evidently a misprint and should read: "Tension in $R = \frac{0.3\,L\,R}{C}$, or to be more exact, $= \frac{5}{16}\,L$ sec angle formed by R and C."

But what I wish to bring particularly to your mind is the statement: "The beam should be made so that B is strong enough to support the $\frac{1}{2}\,L$ which comes on it."

To judge from this, Mr. Hill disregards the stress in B which he finds approximately by his formula (36) and does not consider it a factor in determining the dimensions of the beam. The low fibre-stress which Mr. Hill employs for beams (one-half that used by the engineers of the World's Fair) may make it safe, in certain cases, to disregard the column action in a trussed beam, but where a higher fibre-stress is assumed it would surely be advisable to have a more exact method of calculation.

Yours truly, ALEXANDER C. ESCHWEILER.

New York, N. Y., July 5, 1893.

To the Editors of the American Architect:—

Dear Sirs,— Concerning Mr. Eschweiler's criticism of June the 29th, it seemed to me that the form of Formula 34 was a more convenient one for quick office use than the more exact one stated by him, and was therefore preferable since in either case the size of R would be but slightly affected.

Concerning the size of B, it would perhaps have been a little better to have added the words "in addition," so that the sentence would read: "The beam should be so made that B is strong enough to support the $\frac{L}{2}$ which comes on it, in addition."

The fibre strains employed are an essential part of the formula necessarily, and the formulas given both here and elsewhere must be interpreted in that light, as otherwise they might lead the unwary into trouble.

Concerning the amount of fibre-stress, while I am not satisfied that it is appreciably below that employed at the World's Fair in their later structures, I am satisfied that it is as high as it should be for ordinary every-day commercial timber.

Yours truly, Geo. Hill.

Notes and Clippings

The Romantic Story of St. Bartholomew's, London.— The further instalment of restoration which St. Bartholomew's Church, Smithfield, has undergone, and which will be formally inaugurated on Monday by the Prince of Wales, is an interesting feature in the history of one of the oldest and most curious churches in London. It marks the removal of the last secular encroachment upon the old ecclesiastical building, which formed a part of the ancient Priory of St. Bartholomew, founded under the most romantic circumstances by Rahere, the King's ministrel, who had been companion of Hereward, the last of the Saxons. The church is almost unique, as having been preserved from its erection, in the reign of Henry I, to the present day. The entrance is still through the pointed arch of the Early English period, with dog-tooth ornaments and four gracefully moulded orders, under which the monks passed when the church was surrounded by cloister, chapter-house, refectory, great and little close and all the other appurtenances of a monastic community. All the pilasters except one have disappeared, but the capitals remain, and the noble gateway, though much crumbled with age, has stood here since the days when it led to the monastic enclosure. Seven hundred and seventy years have passed since the erection of this church, and yet so much remains still to show what it was when seen by its founder. If the church has had a strange history its origin is stranger still. It borders, in fact, on the grotesque. Henry I had a jester named Rahere, a curious fellow, who lived hard and with no thought of hereafter. But while still a young man he had a sudden awakening, and to still his conscience went on a pilgrimage to Rome. This was the initial incident which led to the founding of the church. At Rome Rahere fell ill, and being in fear of death made a vow that if he recovered he would found a hospital for poor men. He did recover and journeyed home, still intent on carrying out his purpose, an intention that was confirmed by a vision from St. Bartholomew, who pointed out Smithfield to him as the place where he was to build it. Smithfield then was an unpromising spot for the purpose — a place outside the city walls, little better than a marsh, celebrated mostly as a place of execution, as, indeed, it was for centuries afterward. Rahere, however, was a man of his word. He got a grant of the land from Henry, drained the marsh, built the church and a priory round it, and himself became the prior. With little money to build the place, he had resorted to a trick to get a great deal of the work done — donning, metaphorically, his cap and bells, and starting men carrying stones as a jest until the contagion spread, and vast numbers entered into the huge joke of building the place. In this way was the place built at a minimum of cost, yet so satisfactorily that the part remaining intact is still substantial and durable. The London of to-day has practically grown up around it, and in the nearly eight centuries of its existence strange scenes have been enacted. Mention cannot be made of St. Bartholomew's without calling to mind the fair, which was originally started for the purpose of procuring funds for the Abbey. The dispersal of the monks, the degeneration of the fair, the gradual decay and removal of the old Abbey buildings until only the church remains, and the spreading of dense populations for miles around is as much the history of London as it is of St. Bartholomew's; but on the occasion of the dedication of the restored building it will be recalled to mind and form a prominent part in the congratulatory speeches that are to be expected. — *The London Globe.*

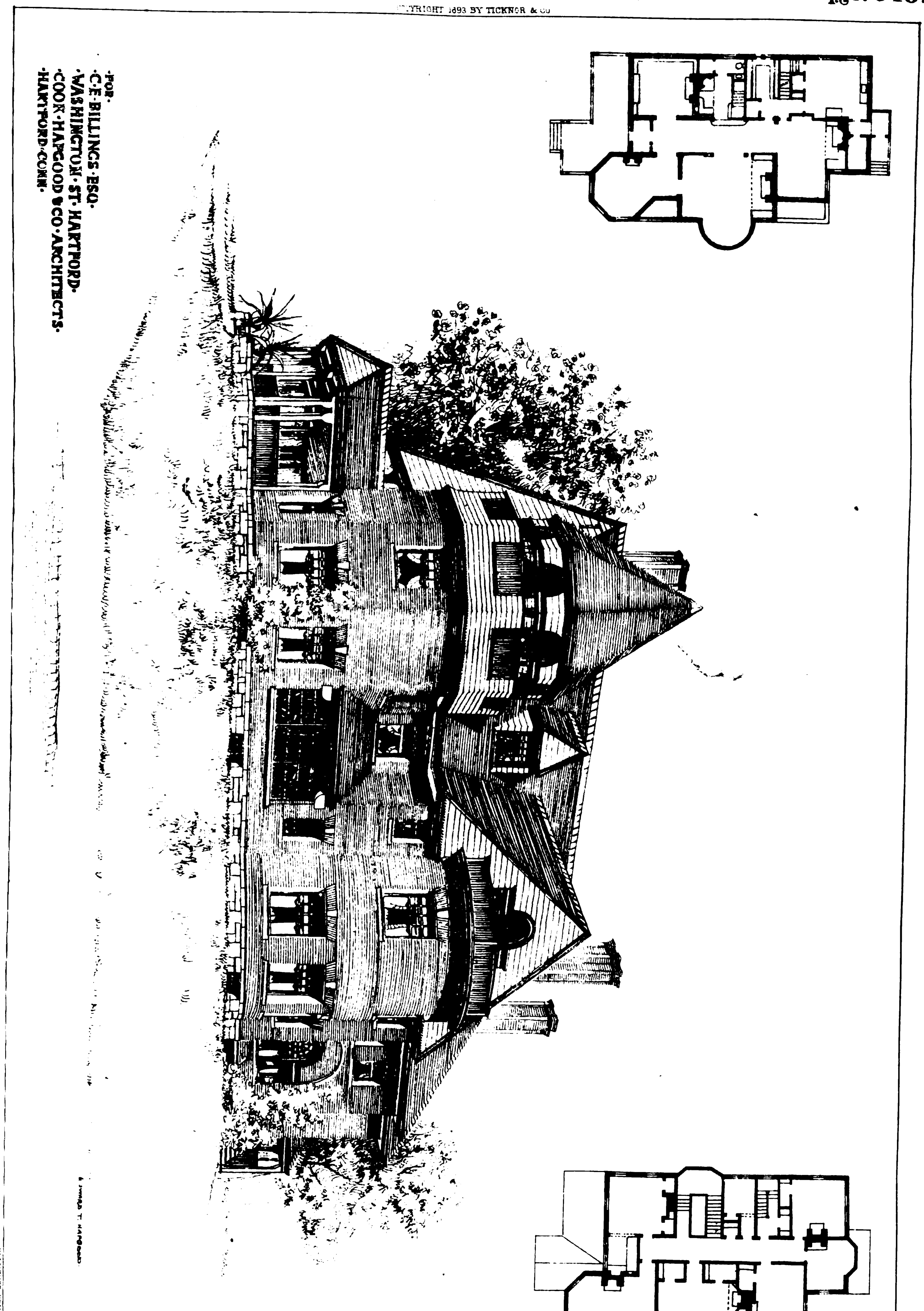
Tunnel Ventilation.— In the important matter of ventilation, the method resorted to in the tunnel beneath the Mersey at Liverpool is claimed to present one of the most striking achievements. Extending as does this tunnel deep below the bed of the Mersey to the solid red sandstone, and approached at either end by elevators of seventy and ninety feet lift, it was foreseen that ventilation was a necessity of the gravest character. The tunnel is large enough to avoid the piston action, its cross section being several times that of the trains, and, at and near the middle of the tunnel, are openings to a smaller side drift or tunnel running alongside of the main tunnel to the shore end, where is fixed a large fan, the result being that air constantly enters at the stations, which are thus swept clear of all foul air. A train starting in pure air at the station follows the air travelling in the tunnel up to the centre, and any change of air between train and tunnel is thus less than it would be if the air in the tunnel were not moving. Past the tunnel centre the train begins to travel against the moving air, by which time the air in the train will be more or less fouled by the passengers, and the ventilation due to train motion then begins to increase. The first air entering from the tunnel to the train is perhaps as good at that time as the air in the train, and, as the train proceeds, it meets purer air at every foot forward, and when it reaches the station is in air of surface quality again. — *New York Sun.*

Building Operations in Washington.— Nearly $9,000,000 were expended in this city during the fiscal year just ended in brick and mortar. This is the story that the figures in the office of the Building Inspector tell. The year before the amount reached over $9,000,000, but the building then done in this city was unprecedented. More money was spent in putting up new houses and in improvements of various kinds during the year ending June 30, 1892, than in any previous year in the history of the city. It was an increase over the previous year of about $1,250,000. In the number of new houses alone there were 783 more houses put up in the year ending June, 1892, than in the year ending June, 1891. During the past year, the year ending June, 1893, there were 2,720 new houses erected in this city, a decrease over the phenomenal record of the previous year of only about 200. The total amount expended in building improvements is only slightly less than that which is the record of the banner building year. It is probable that the decrease is due largely to the law which went into effect in June last, which practically prohibited the erection of houses in alleys. Now, in order to get a permit to erect a house in an alley, it is necessary, in the first place, that the alley should have a width of thirty feet and that the building-line should be five feet back. Then the alley must have water, sewer and gas, and must run through from street to street. — *Washington Star.*

Trade Surveys

The business world is no better off than a month ago. Less business is being transacted than one and twelve months ago, and probably at lower margins. Prospects are favorable for better things. The production of wealth goes on as usual on both sides of the Atlantic. Workers are busy. Compensation is fair. Employers and middlemen make less than in other times, but their disadvantage is the advantage of others. Fear actuates some who should foresee clearly. Bankers, whose business it is to understand the drift of things and the causes of abnormal conditions, either do not, or act as though they do not, understand what is fundamentally wrong. Gold goes because there is not enough to go around, and because it is needed to pay debts due in gold. The selfish interests of money-lenders and the selfish interests of silver-miners becloud their judgment and mislead the people. Surprises are in store for financiers in all parts of the world. That of India is the first. There is an underlying necessity in regard to economic questions which will work out their own conclusions, regardless of selfish interests on one side or the other, and he is the wiser man to-day who will hold his words and watch patiently. The expansion of population throughout the world, the upbuilding of energetic communities, the building of railroads, the cheapness of ocean travel, the development of mineral and agricultural resources, are all working up new material with which to build new walls and new superstructures. Our bee-hive is full of honey. Our productive capacity has been expanded beyond present consuming-capacity. The wheels of industry can go faster than they need go. This gathered energy it is that is making demands which money-lenders accustomed to canal-boat conceptions of progress do not understand. The present contest, stripped of its feathers, is to do the business of the world on a gold basis. Uncle Sam is scratching his head over it. In business circles apprehension is deep. Failures last week show a further increase. Liabilities were large, but the July settlement day passed more comfortably than was expected. The promise of repealing legislation gives some encouragement. Bankers are beginning to be more accommodating, but at the savings banks there is nothing going on. Hundreds — in fact, nearly all — are standing in expectation of runs. Deposits have declined sixty per cent. Among merchants and jobbers, especially in New York, the feeling is more hopeful. The depression has hardly yet touched the little country towns. The small store-keepers have been selling goods along as usual, and comparatively little cash due is unpaid — much less than one would suppose. Counters and shelves are low in goods. At manufacturing centres, very little time has been lost so far this year, especially in New England, nor is there any accumulation of goods. Distribution is progressing even now at a healthy rate. In the heavier lines, as iron, steel, coal, lumber, petroleum, cotton, etc., there has been no more than a slight contraction of business, and that only a prudential contraction. In those regions of Pennsylvania and Virginia which ship coal East, the production this year is two million tons in excess of same time last year up to June 30. Taking lumber in the South, it appears the production is greater, especially in yellow pine and cottonwood, a new substitute for poplar. Looking at the building trades, especially as shown in reports for June for the larger cities, there are evidences of a falling off, which is laid to tight money. Yet the material-men do not complain, and there is no word of cancelled contracts for brick, lumber, cement or anything else. The planing-mills are, as a rule, busy. Parties familiar with movements of real-estate in cities say the strong upward tendency of prices has been checked, and attribute it partly to the growth of manufacturing facilities in suburban localities, and to the greater desirableness of such localities for residence purposes. True it is that fancy prices for building-lots in built-up sections have received a setback. Some authorities on rural real-estate have lately asserted — perhaps in a prophetic vein — that should trolley-road building progress at the threatened rate for two or three years, it would work a most desirable transformation in country real-estate in making markets for products not now raised. The fact has been heretofore noted that the growth of agriculture has stimulated manufacturing activity, especially in lines identified with agriculture. Recent observation confirms this. Much material has been contracted for in Chicago and St. Louis during the past two or three weeks for concerns engaged in making all manner of things used on and about farms and plantations. The industrial situation is satisfactory. Labor is quiet. Organizations are passive. The short-hour movement, which has been making so much stir in England, seems not to have taken root here. Possibly it may later on, when conditions are more favorable, but meanwhile legislation is planting stakes down where they will do most good, in defining the limits within which agitation is legitimate.

S. J. Parkhill & Co., Printers, Boston, U. S. A.


·FOR·
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Rough wooden centres
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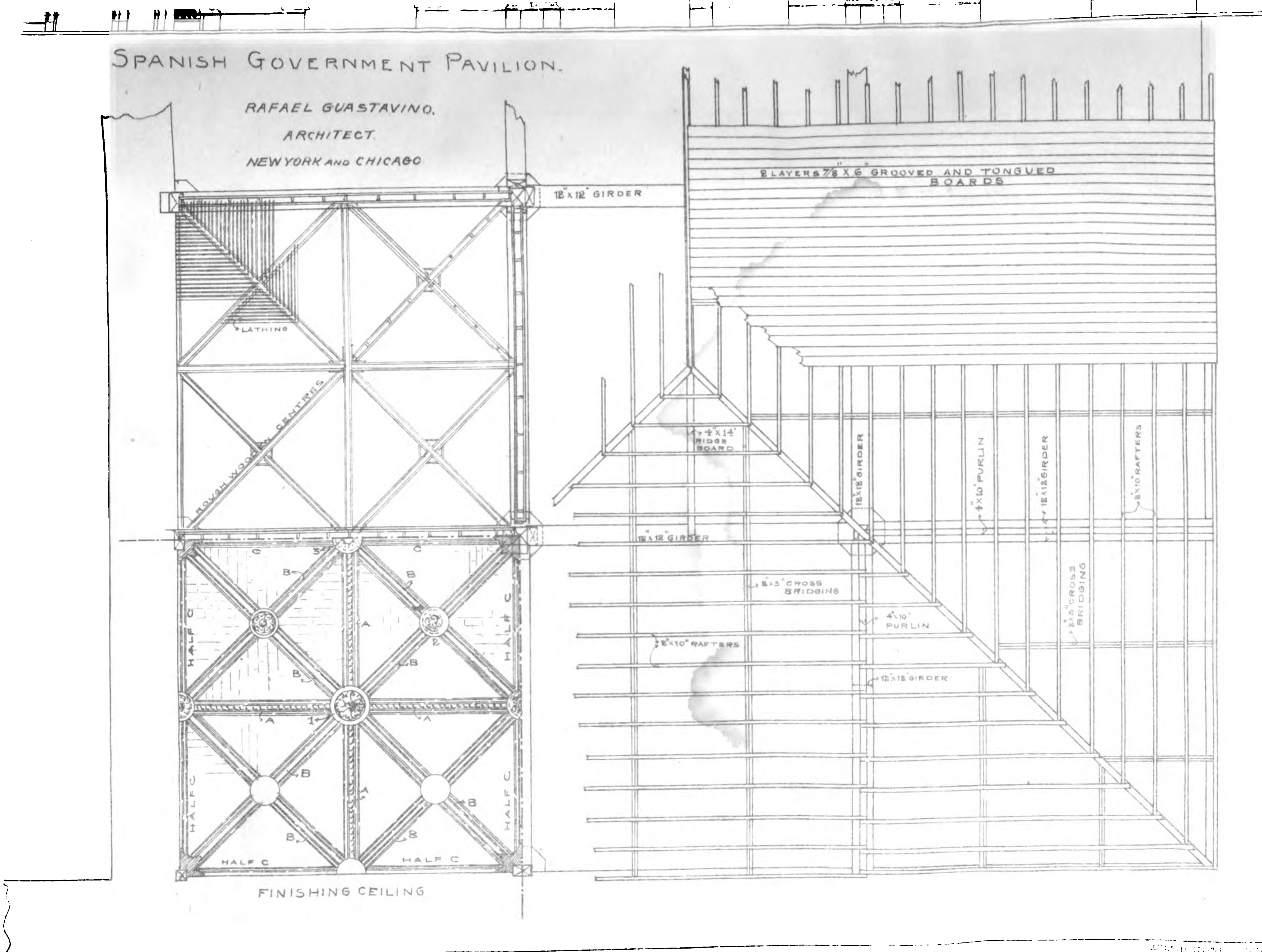
SPANISH GOVERNMENT PAVILION.
RAFAEL GUASTAVINO,
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NEW YORK AND CHICAGO
12" x 12" GIRDER
2 LAYERS 7/8" X 6" GROOVED AND TONGUED BOARDS
LATHING
ROUGH WOODEN CENTRES
4" X 14" RIDGE BOARD
12" x 12" GIRDER
12" x 18" GIRDER
4" x 10" PURLIN
12" x 12" GIRDER
8" x 10" RAFTERS
3" x 3" CROSS BRIDGING
2" x 3" CROSS BRIDGING
4" x 10" PURLIN
8" x 10" RAFTERS
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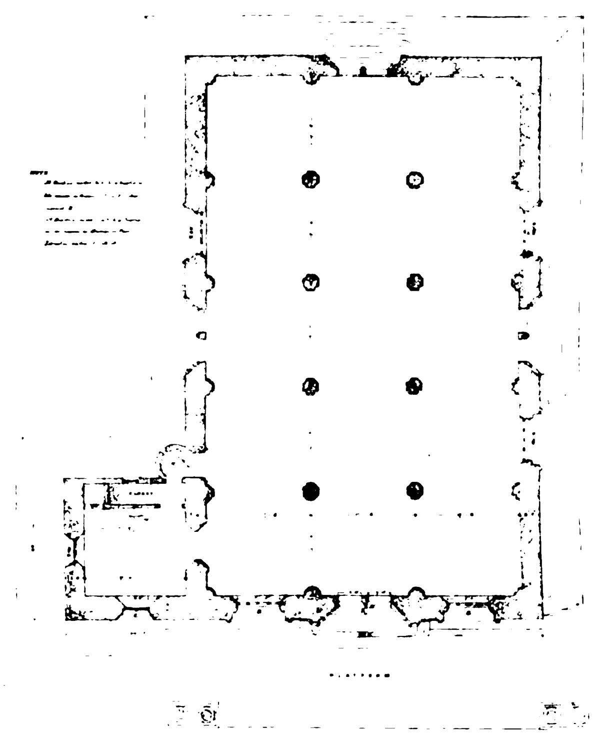
FINISHING CEILING

No. 916. American Architect and Building News, July, 15. 1893.

— Worlds — Columbian — Exposition —

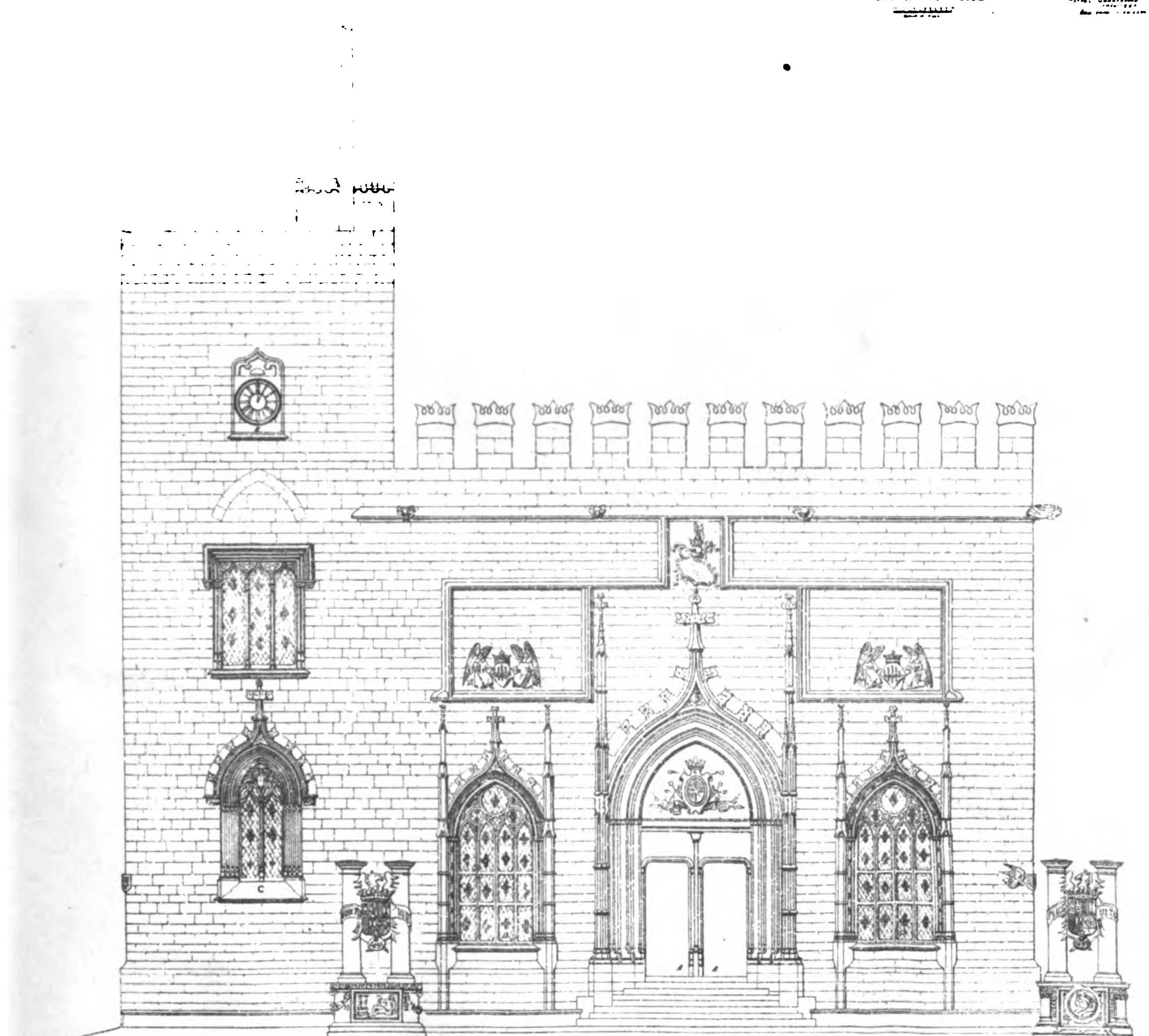
—— Front Elevation of the Building
of the
——— Spanish Government Pavilion — —



Plan of First Floor

Scale of Feet

Rafael Guastavino
Architect
New York and Chicago



Scale ½ in One Foot.

— Front — Elevation —

Scale of Feet

Rafael Guastavino
Architect
New York and Chicago.

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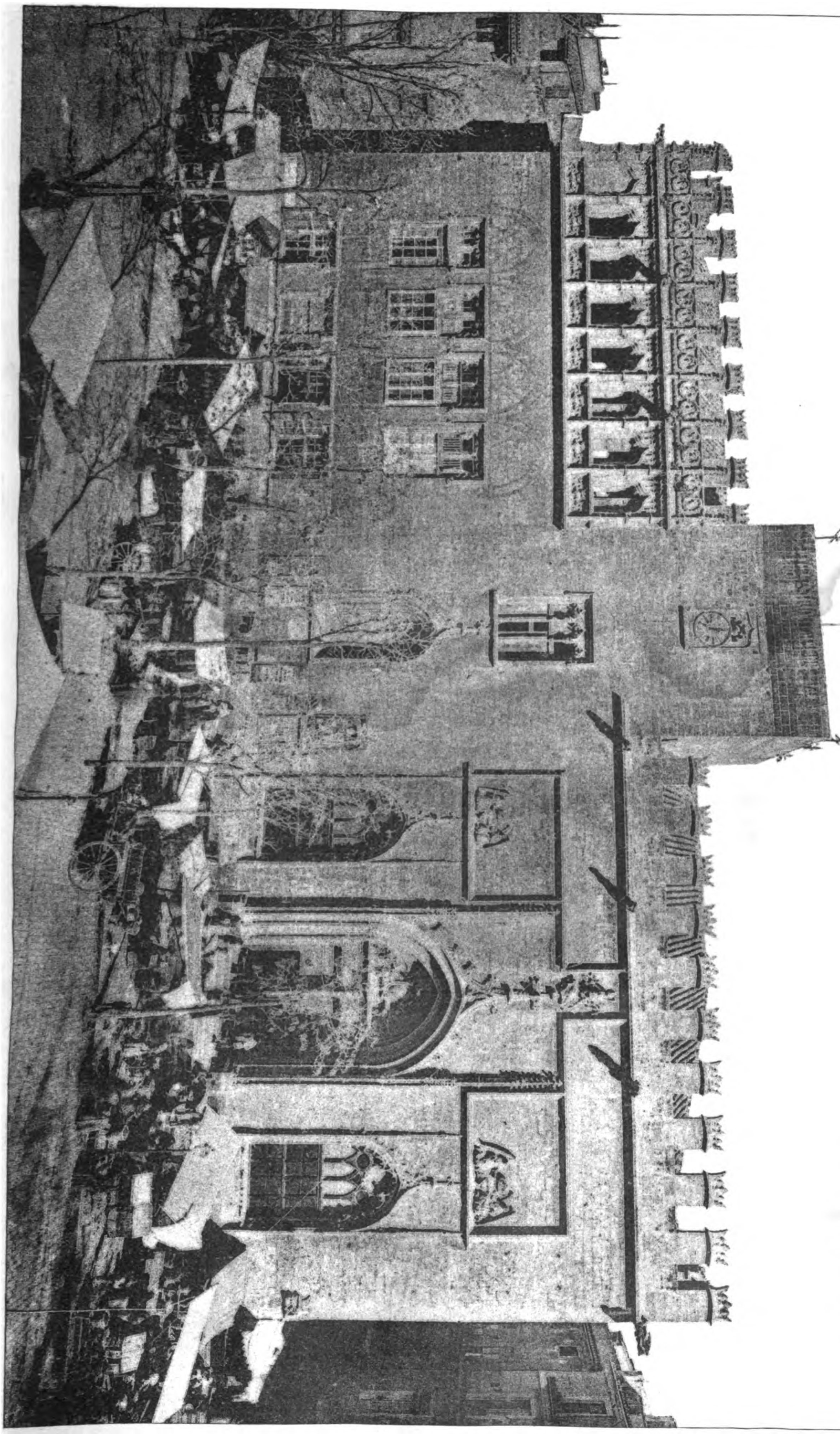
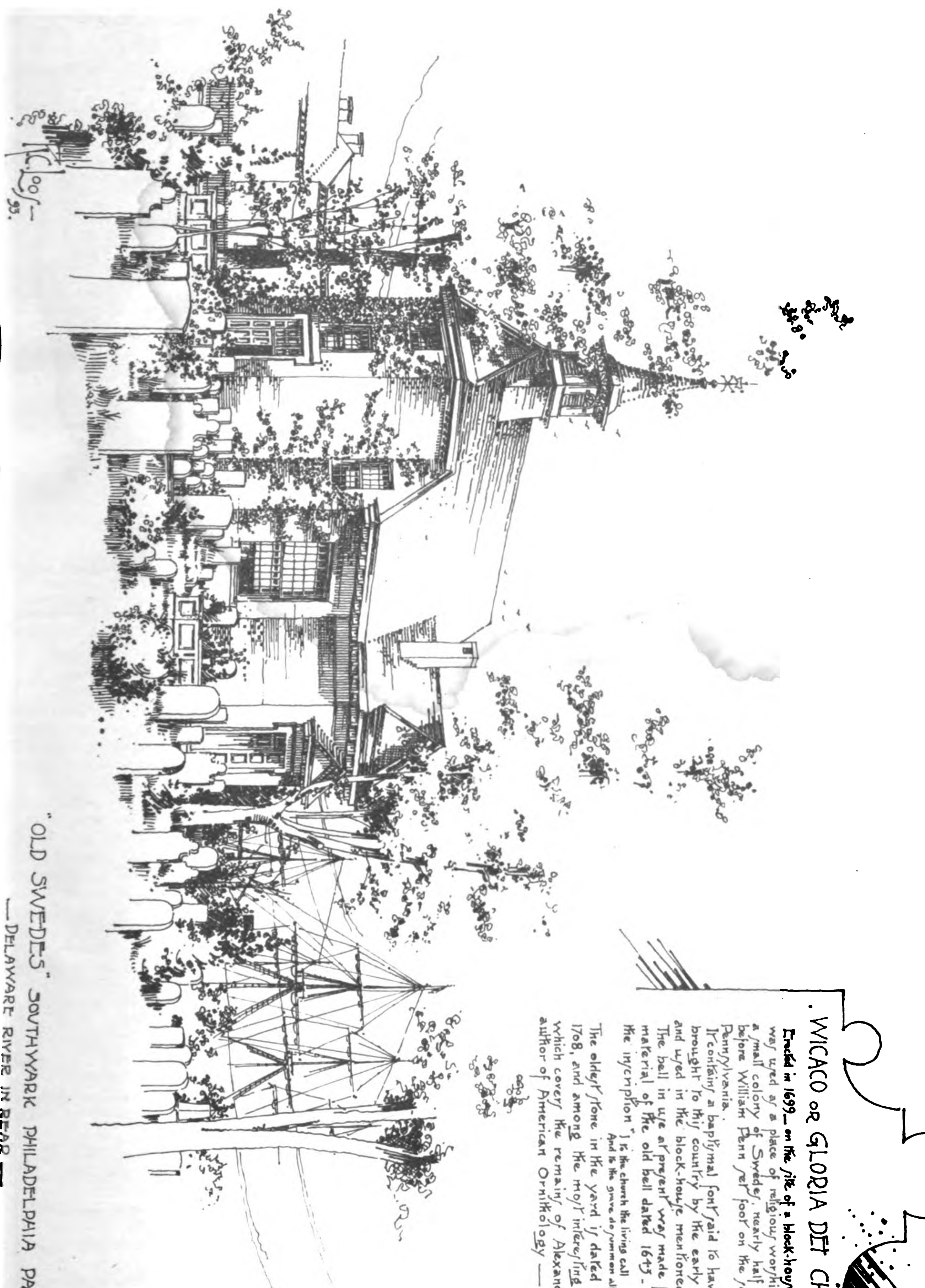


VALENCIA.
LONJA – FACHADA PRINCIPAL
Pedro Compte 1482–1498.

HELIOTYPE PRINTING CO. BOSTON



"OLD SWEDES" SOUTHWARK PHILADELPHIA PA.
— DELAWARE RIVER IN REAR —

THE AMERICAN ARCHITECT AND BUILDING NEWS.

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JULY 22, 1893.

CONTENTS

MESSRS. WALKER & KIMBALL, of Boston, have made a valuable suggestion for a rapid-transit sub-way for that city. They have, perhaps first among those who have treated the subject, fully adopted the system of underground travel, and propose to excavate the whole width of Tremont Street, covering the excavation with concrete vaulting, decorated on the underside with white glazed tiles. In the middle of the space would be two tracks for express trains, sunk below the general level, and the tracks for accommodation trains would run on each side, while a wide platform would occupy the space between the accommodation tracks and the fronts of the buildings on each side, the basements of the stores being fitted up for retail trade, and opening on the platforms, these constituting a continuous sidewalk. The scheme resembles that of the Arcade Company for a Broadway road, but with several improvements, both in construction and arrangement. Messrs. Walker & Kimball provide access to their express tracks by tunnels under the accommodation tracks, and stairways up to the stations, bridges being thrown across the express tracks, to provide communication between the upward and downward accommodation tracks. Of course, the whole structure would be brilliantly lighted by electricity, and those who have seen a modern first-class underground establishment, such, for instance, as the subterranean café in the Equitable Building in New York, will not need to be told how attractive it may be made.

ONE of the Boston papers, after a rather extravagant eulogy of the Fair buildings and grounds at Chicago, asks why architects and landscape gardeners cannot be employed to lay out the new portions of growing cities, instead of leaving them to chance. It says, what is probably true, that it would be profitable for almost any American city to level all its buildings with the ground, stake out its streets afresh, under the direction of such experts as those who were enabled to display their skill at Chicago, and rebuild, under the same direction. Of course, there is no possibility of anything of the kind being done, but there is no reason why the principle should not be applied to the laying-out of new quarters of existing towns. In many Continental cities, within the past few years, competitions of architects have been held for designs for laying out new suburbs, the municipality furnishing plans of the district to be treated, appointing the jury, awarding the prizes and carrying out the scheme, making its own terms with the private owners of the territory involved. In Germany, this manner of treating the subject is the rule, and the results are to be seen in the splendid new quarters of the more important towns, which present about the most complete contrast that could be imagined with the idiotic folly of our suburban street-planning. We are accustomed to speak, and with good reason, of the short-sightedness of our forefathers, who laid out the older American cities in such a way that, for example, Boston has had to spend forty million dollars, within the past twenty-five years or so, in straightening and widening the crooked thoroughfares which sufficed for the last generation; but the cows who are reputed to have laid out old Boston were intelligent and far-seeing engineers, in comparison with those who design the streets of new Boston. The Puritan cows, in their excursions to their distant pastures, left tracks radiating into the country at such distances apart as to give roomy farms and pastures between them. Later, the counties intervened to establish a few main roads in addition to the cow-tracks, and on this foundation the structure of suburban street-planning is built. The process of designing is something as follows: In the transmission of estates, the farms bounding on more than one street have mostly been divided, so as to make lots, of a greater or less number of acres, with frontage only on one street. The proprietor of one of these lots is seized with a desire to "improve" his property, and, while his neighbors stand around, deriding his "Folly," employs the local cellar-digger to construct one, two or more short pieces of road, extending, at right angles with the street, to the back line of his lot, where they bring up against a fence, placed there by the adjoining owner to prevent the "Folly" from infecting his own peaceful estate. A few years later, another proprietor in the neighborhood goes through the same process, and so on, until the district is filled with little slums, branching from a few principal streets. The effect of this planning on the beauty of the metropolitan region which comes subsequently to occupy the district may be imagined, and its effect upon the beauty is nothing in comparison with its results in depleting the city treasury when it becomes necessary to cut among these dismal alleys to get light, air and proper facilities for communication.

THE most interesting "Labor" news of the last few days is the story of the Paris riots. From the accounts, it appears that certain students in the Latin quarter got up a ball, to the management of which the police authorities felt themselves under the necessity of objecting. The students resented the interference of the police, and expressed their resentment by promenading the streets and yelling. Then the police attempted to stop the yelling, and a fight ensued, in the course of which several students, and several policemen, were bruised, and a bystander was killed in the scuffle. In token of mourning for this unfortunate, the students, assisted by volunteers from among the filthy ruffians who lurk about Paris, began to break the windows of the public buildings, and declared war against the little girls and boys who sell newspapers in the street kiosks, turning them out of their shelter, and burning their stock-in-trade, with the kiosks themselves, in heaps in the streets. The ruffians, finding this sort of sport greatly to their minds, gathered in increasing numbers, and added to their enjoyment by seizing and overturning all the cabs, horse-cars and omnibuses that they came across, piling them in the streets, and setting them on fire, beating the inoffensive people whom they found, plundering the shops, and so on. By this time the students found the flavor of the sport rather too strong for their stomachs, and began to fall out of the ranks of the rioters, and when the latter undertook to storm the Charity Hospital and the École des Beaux-Arts they retired entirely, some of them even volunteering to aid in the defence of public and private property. Meanwhile, the Government officials, who know by experience the attraction that robbery and bloodshed have for the apostles of the dignity of labor and universal brotherhood, sent orders to have the Labor Exchange building closed, so as to shut off the eloquence of the walking-delegates. The latter, however, had anticipated them, and filled the place with a mob of three thousand of their followers, who defied the police authorities, while fifteen hundred more paraded the streets, lending at least a moral support to the swarms of thieves who were ransacking the better

class of buildings in the quarter. At the last accounts, quiet had been restored, with the help of the military, but the robbers and ruffians have practically secured another important victory, in having had, for some days, a rich quarter of Paris at their disposal, with perfect liberty to steal and destroy at their pleasure.

SUCH performances as these set one to thinking seriously of the extremity to which eloquence and literature are bringing the decent part of mankind. In all great cities, half the population is told every day that the people who do as little work as they can, and do that ignorantly and dishonestly, are those whose example is most worthy to be followed, and whose imitators, by means of organized violence and oppression, will soon control the world. Of course, only a fraction of the people who now read this rubbish believe it, but the fraction grows larger every day; and so long as "labor-reformers," with the applause of cheap newspapers and fawning politicians, are allowed to teach that it is lawful to conspire to prevent honest men from working, the number of people who will see the logical consequence of this doctrine in the principle of Ravachol, who never did any work, but, when he saw anything he wanted, killed the owner and appropriated it, must continue to increase, and attempts at the practice of the arts by which this consummation of "labor reform" is to be reached must multiply.

ANOTHER thing which must act powerfully to incite the vicious to deeds of violence is the extravagant way in which such deeds are celebrated by the newspapers. To be known, to have one's name published all over the world, coupled with adjectives expressive of the noblest of human qualities, is something which many men desire above all things; yet this honor seems now to be reserved exclusively for criminals. Every newspaper teems now with accounts of "daring" burglaries, "bold" robberies, "well-planned" and "successful" swindles or "skilful" forgeries, and many an honest young hero would give ten years of his life to have such words publicly applied to him as can be readily earned by pounding an old woman on the head with a club from behind a fence. If the people who write these praises of cowardly violence think that they have no effect upon those disposed to crime they are very much mistaken. Any captain of a police station can testify to the eagerness with which criminals read the newspaper accounts of their "daring" deeds, and even the terrors of death are mitigated to the egotistical brutes of the anarchist type by the gratification which their vanity receives at the hands of the newspaper editors. If half as much credit for courage could be publicly given to the brave police of our great cities, who, day after day, put to flight ten times their number of armed and howling ruffians, as is attributed to the assassins whom they hold in check, we should see the authority of the law greatly strengthened. At present, it is the contemptible fashion among politicians, more, perhaps, in Paris than elsewhere, to slight and insult the faithful guardians of our homes for the sake of currying favor among those whose hatred of a policeman is proportionate to their fear of him. This habit of talking has borne fruit in blood, and it is quite time that some one should take courage to defend in public the unpretending old principles of morality and justice, which are as favorable to true liberty as those of violence and conspiracy are opposed to it.

DR. ALFRED STUBEL, a distinguished German geologist, made a visit, some sixteen years ago, to the western portion of South America, and, on his way, examined closely and carefully the ruins of what seems to have been once the great city of Tiahuanaco, on the shore of Lake Titicaca, in Bolivia. On his return to Germany, his notes and photographs were submitted to Dr. Uhle, a very high authority on South American archæology, for examination, and a book has now been published, containing an account of the explorations, with Dr. Uhle's comments. According to this distinguished scholar, the constructions at Tiahuanaco must be ascribed to the Aimara, a race of Indians which still occupies a large part of Bolivia and Peru, and preserves something of its ancient barbaric civilization. Although nearly every antiquity of an architectural character in South America is ascribed to the Incas, Dr. Uhle is inclined to believe that the work at Tiahuanaco was done before the conquest of the Aimara by the Incas, an event assigned by the Spanish chroniclers to the early part of the twelfth century. It is quite possible that the remains may date from the very time of the conquest, for there is internal evidence that the sculptured stones which are strewn over the soil were never placed together in a building, and on many of them the cutting is still unfinished, as if the work had been suddenly interrupted and never again resumed. However that may be, the intended buildings must have been laid out on a colossal scale. Some of the carved blocks measure thirty feet in length by fifteen feet in width and six feet in thickness, and would weigh about two hundred tons, while very few weigh less than one hundred and twenty-five to one hundred and seventy-five tons. These enormous stones are mostly of lava, brought, apparently, by water from a distant point on the shore of the lake, and dragged about twenty miles from the landing-place to the site of the building; but the columns and the colossal sculptured figures, of which there are many, are of red sandstone, from a quarry in the neighborhood of the ruins. Dr. Uhle thinks that the stones, although beautifully smooth and square, and deeply carved, were wrought without the help of metal tools, and suggests that the rough shape required was given to the block by heating, joined, probably, with sudden cooling, by which large fragments were detached, while the subsequent working and polishing was effected by hammering with a stone still harder than the lava. The photographs of the blocks, however, show drill-holes in adjoining blocks, with channels cut between them, exactly as such stones would be cut now to receive metal clamps, and the *Deutsche Bauzeitung* finds it difficult to believe that metal in some form was not used by the workmen.

A SUGGESTION has been made, which we hope will be carried out, that a statue or bust of the late John W. Root should be erected in the rotunda of the Administration Building at the Chicago Exposition. Few persons outside the profession know how much Mr. Root contributed to the artistic success of what is justly regarded as one of the greatest architectural achievements of the century, and, while it is thus peculiarly fitting that the part which the profession has taken in the Fair should be commemorated in the memorial to Mr. Root, it is a pleasure to think that such honors to him would be indirectly a compliment to his partner — a compliment, too, which would be particularly pleasing to Mr. Burnham, and which no one connected with the Fair has better deserved.

MR. JAMES ALEXANDER BLANKINGSHIP, one of our young sculptors whose work was promising, died recently in New York from the effects of a dangerous surgical operation. Mr. Blankingship was born in Virginia, thirty-four years ago, and from boyhood showed a strong inclination for sculpture. After a short period of successful study at home and in New York, he went to Paris, and entered the studio of Chapu. He remained in Paris, studying and practising, for thirteen years, returning in 1890 to New York, where he was engaged as Professor of Sculpture in the Institute of Artist-Artisans. His abilities soon found recognition in his native country, and he was engaged to model three groups for the Administration Building at the Chicago Fair, besides a statue for the Electricity Building.

WE do not pretend to understand the merits of the jury system at the World's Fair which has caused so much dispute and discussion, so we can but note without comment the latest phase of the difficulty. This appears in the report that the International Jury for the Fine Arts Department have, as a consequence of their first meeting, served notice on Mr. Thacher that any attempt on his part to enforce his one-man system will lead them to withdraw all their exhibits from examination. We cannot tell whether the American jurors join in this action: it is quite as likely they did as that they did not. The American jurors in this section are: Oil — John Lafarge, New York; Thomas Hovenden, Plymouth, Pa.; William M. Chase, New York; Worthington Whittredge, New York; George W. Maynard, New York; F. D. Millet. Water-colors — J. C. Nicoll, New York; R. Swain Gifford, Nonquit, Mass.; Walter S. Shirlaw, New York. Architecture — Russell Sturgis, New York; W. P. P. Longfellow, Boston. Sculpture — Olin L. Warner, New York; D. C. French. Etching — Frederick Dielman, New York.

PORCHES.[1]

Fig. 1. San Clemente, Rome.

THE word *porche* is the French form of the Latin word *porticus*, which is more faithfully rendered in *portique*, a term but little employed except in connection with Classical antiquity. We have to do here with the Middle Ages, and more particularly with church architecture. The early porches were, nevertheless, derived from the porticos or colonnades forming an *atrium* on the front of Roman basilicas (Fig. 1). The latter is found in the ninth century at San Ambrogio at Milan [See "Lombard Architecture," Figure 2, *American Architect* for September 10, 1892]; there was a similar one in the fifth century at St. Martin's of Tours; but often after that only the disposition of a gallery attached to the façade of the church was maintained, as is seen in many Italian churches down to the eighteenth century and in a few

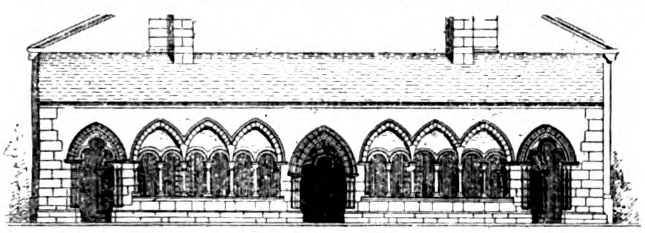


Fig. 2. Porch at Toury (Eure-et-Loire.)

French structures, especially in those belonging to the French and Champagne schools of the eleventh to the fourteenth century (Urcel, Cauroy-lès-Hermonville, Toury [Fig. 2], etc.; approaching it, the porch of the Cathedral of Noyon, see "*Cathédrale*," Figure 33, and in Normandy that of Séez, see "*Cathédrale*," Figure 38).

When national traditions began to take definite shape in France, in the first half of the eleventh century, church porches assumed a very great variety of forms. The galleries referred to above, which were at first built to project from the

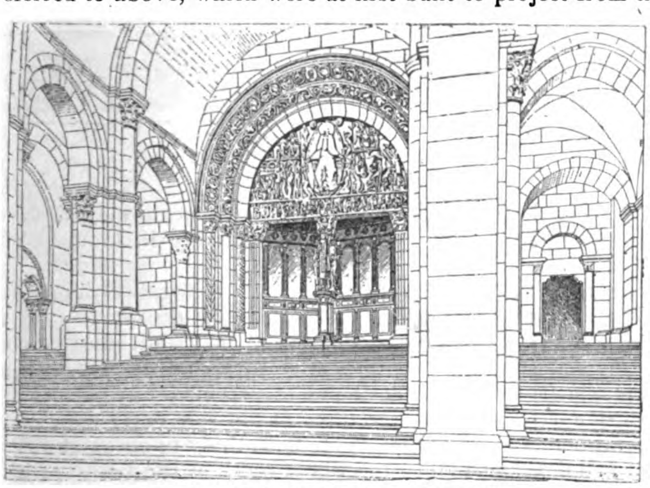


Fig. 3. Porch of the Cathedral of Autun.

façade, were incorporated into the mass of the nave and constituted its first bay. However, this logical change was not effected until quite late; we note it in certain Rhenish houses of worship of the twelfth century, as at Guebwiller in Alsace, and in the principal Burgundian churches of the thirteenth and fourteenth centuries, as at Notre Dame at Dijon [See "*Bourgogne*," Figure 4], at Beaune, Auxonne and Semur-en-Auxois. The lateral arches of the porch open under the façade towers.

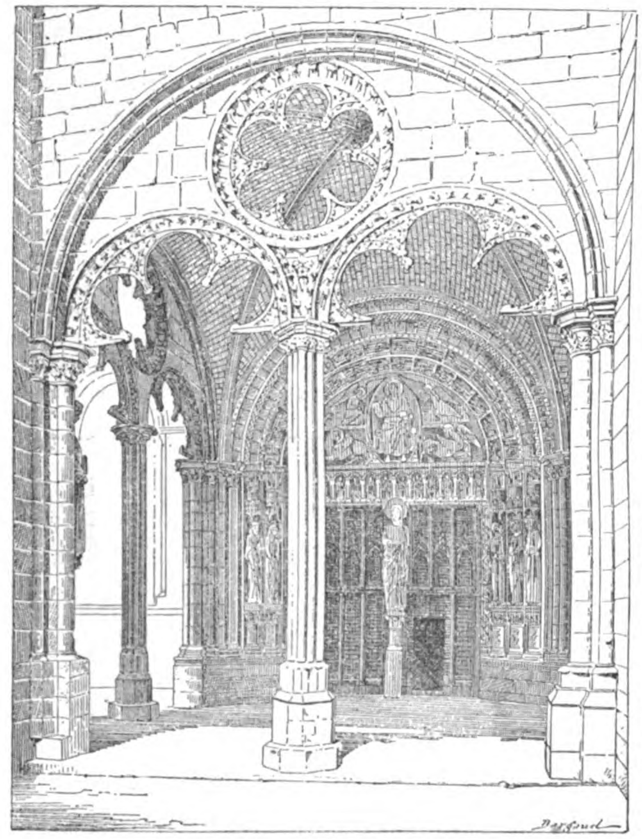


Fig. 5. Side Porch of the Cathedral of Bourges.

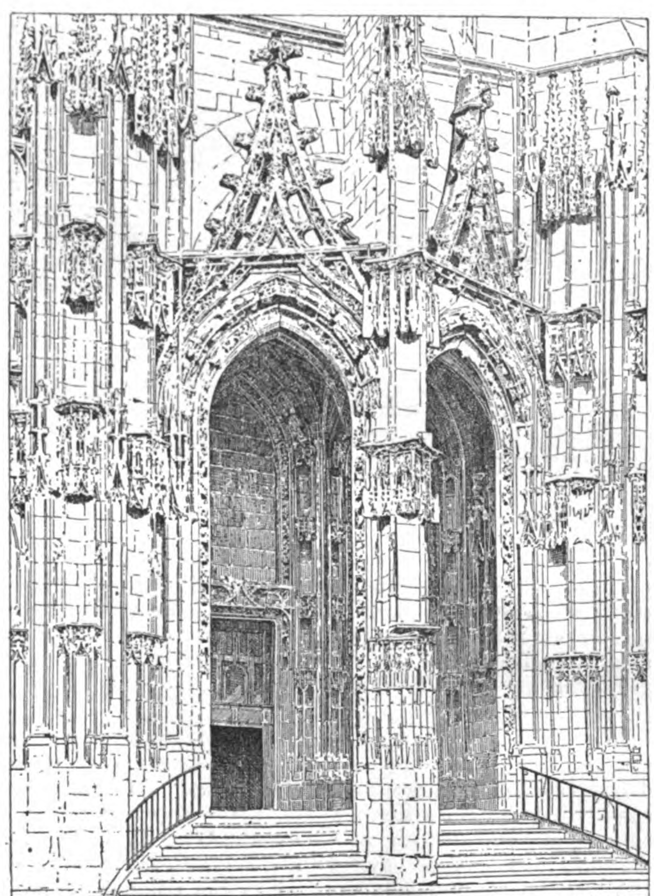


Fig. 6. Porch of Saint-Germain, Argentan.

This disposition was adopted, in the eighteenth century, for the Gothic cathedral of Orleans, and in 1846 for Sainte-Clotilde

[1] From the French of A. Saint-Paul and H. Nodet, in Planat's *Encyclopédie de l'Architecture et de la Construction.*

at Paris. The porches of the Paris churches of La Trinité and Saint-Augustin are allied to this type, though the former has but one tower, which is at the centre of the edifice, and the latter has none.

In the eleventh and twelfth centuries, church towers often formed a porch before the façades; as for example in Saint-Germain-des-Prés at Paris, at Créteil (Seine), Poissy (Seine-et-Oise), Chécy (Loiret), Saint-Savin (Vienne), Saint-Maixent (Deux-Sèvres), etc.; from the thirteenth century, these porches were open at the sides as well as in front, so that only two pillars remained as a support for the tower; an instance of this disposition is seen in the Cathedral of Tulle. The system was much in vogue during the fourteenth and fifteenth centuries in Languedocian churches with a single broad nave.

In case of a marked development of the façade tower, the porch sometimes opens by three arches on each of the three free faces; interior pillars correspond to these arches, the whole giving nine vaulting compartments. The most beautiful, as well as the most famous, example of such porches, which are frequently surmounted by a story of the same character, is at Saint-Benoît-sur-Loire [See "*Eglise*," Figure 10]; the porch of Lesterps belongs in the same class; there was a similar one in Saint-Martial at Limoges; the porch of Moissac is a derivative of this type, but the intermediary pillars on the ground-floor and the inner pillars of both the ground-story and the story above are suppressed.

We touch here the Cluniac style of narthex, or "ante church," a real building preceding the nave and in no way dependent upon the position of the towers. At Saint-Benoît-sur-Loire there were three altars in the upper story; in the Cluniac narthex, which at Cluny and Vézelay had exactly the disposition of a nave with side-aisles, there were also altars, either in the first story or in the tribunes taking its place (See "*Cathédrale*," Figure 9). Although in reality an appendage, or accessory, the narthex was so thoroughly incorporated in the basilica, which it served as an entrance, that its façade was often the one which received the twin towers of the nave; this was true at Cluny and Vézelay [See "Religious Architecture," Figure 23, *American Architect* for July 26, 1890, and "*Bourgogne*," Figures 2, 3], and also of the much smaller narthexes of Paray-le-Monial and Tournus. The altars reared in all these porches, and the imposing dimensions of some, show that liturgical services were held here; they were mainly for the strangers who were welcomed to the monasteries and who were thus enabled, except on grand ceremonial occasions, to attend mass and other services, without disturbing the meditations of the monks; the narthex, in fact, opened into the guest hall.

The Romanesque narthex at Déols had a tower at each of the four angles; a similar disposition was adopted in the fourteenth and fifteenth centuries in St. Pierre of Montpellier.

The porch of St. Lazare at Autun, although entirely open on the exterior (Fig. 3), and that of Charlieu, justly renowned for the richness and grandeur of its sculpture, belong also to the narthex family, as well as the Cistercian porches, the depth of which often does not exceed one bay. The slight importance of the Cistercian narthex seems to be due to the fact that the monasteries of the order, occupying isolated sites and poor in relics, were comparatively little visited by strangers.

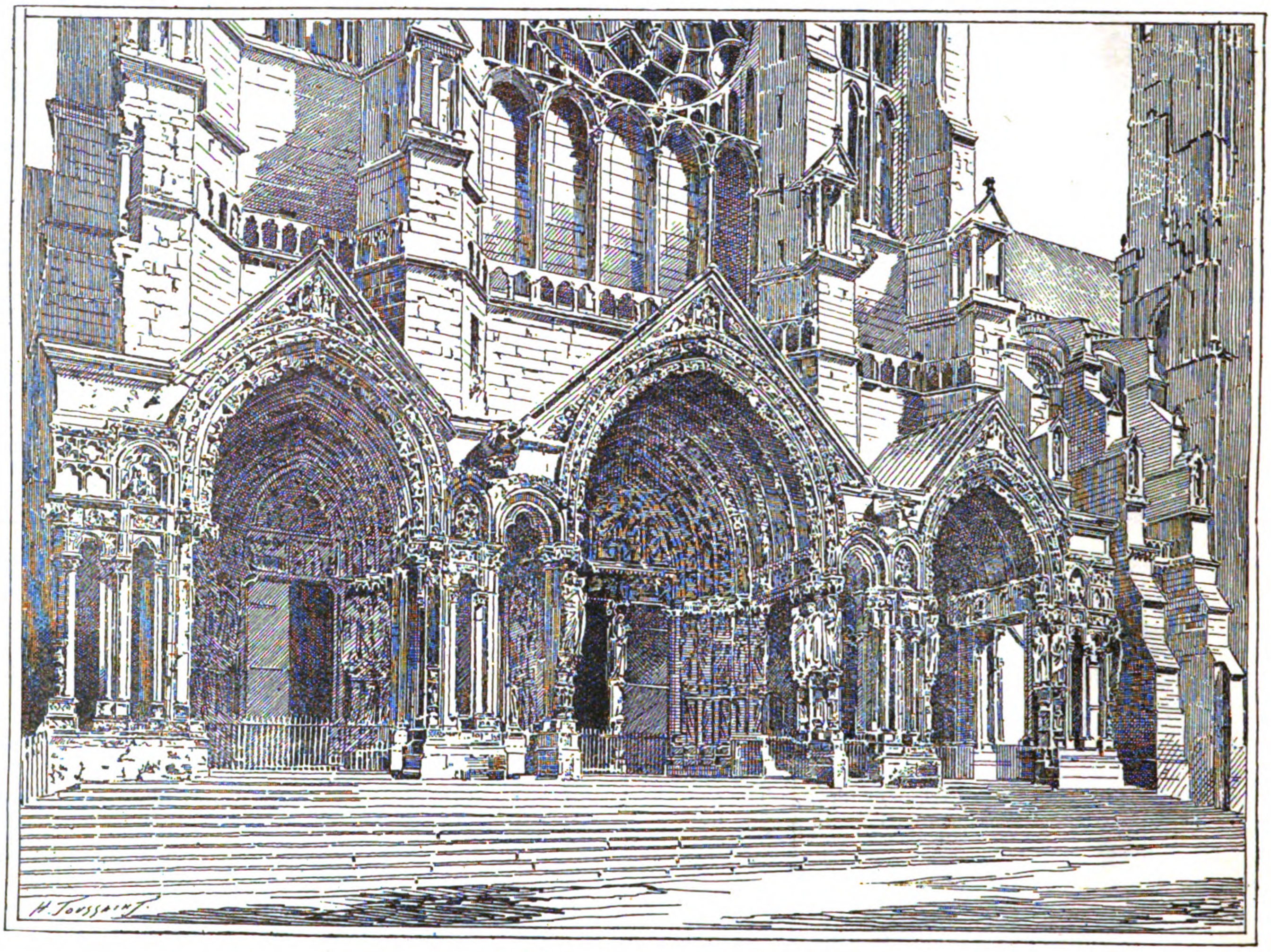


Fig. 4. North Porch of the Cathedral of Chartres.

In the thirteenth century, such a considerable depth was given to the embrasures of the principal doorways — as at Laon, Amiens, Rheims and Bourges — that additional porches on the main façades were dispensed with, and the doors themselves, in fact, received the name of porches; but variety and luxury appear in these structures at the side entrances. The lateral porches of Chartres (Fig. 4), entirely open on the exterior and developed along the whole width of the transept with its side-aisles, are, by their ampleness, their masterly conception, their sumptuousness, and by the fine execution and iconographic interest of their statues, quite unique works, which, according to Viollet-le-Duc, "would have sufficed to immortalize several generations of artists." It was usually the case, especially for entrances disposed along the naves, that the architect was content with a square hall, the breadth of which was determined by that of the bay to which it was contiguous.

When the porch was introduced between two chapels, it was naturally open in front; but, when it was disengaged on three sides, often one of the lateral faces, and more often both, were open (see "Gable," Fig. 3, porch of Bernières). In the Cathedral of Bourges (Fig. 5) two charming porches of this kind are to be seen; they shelter two magnificent Romanesque doors from the church demolished at the beginning of the thirteenth century (Fig. 5).

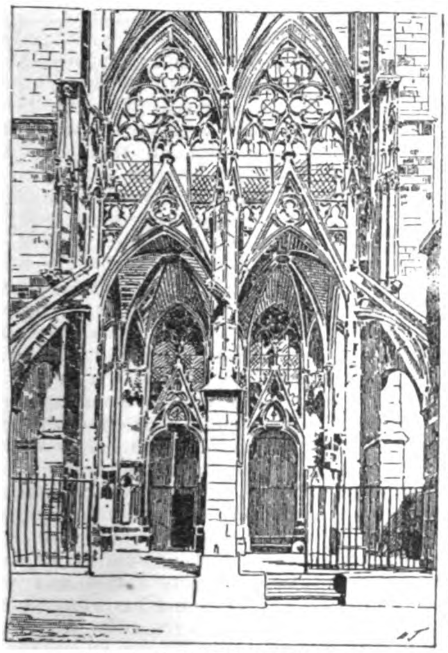


Fig. 7. Saint-Urbain at Troyes.

Normandy is one of the French provinces in which porches have been most commonly a feature of church architecture. In the fifteenth and seventeenth centuries they sometimes have the form of triangles open on both of the exposed sides (Fig. 6). In Calvados and Seine-Inférieure there are a certain number of wooden Renaissance porches, which are very graceful and quite well sculptured. In Picardy, light constructions, oblong in the direction of the axis of the church, are often found in front of façades of the twelfth to the fifteenth century. In Brittany, there are Renaissance porches disposed in the same way, but larger, substantially constructed and embellished on the inside with statues; they are veritable monuments, sometimes surpassing the body of the church itself in luxury.

We have indicated only the principal combinations of French porches; there are many others, more or less faithfully copied from the commonest types. We must mention, for its elegance, at least, the side porch of the church of Candes (Indre-et-Loire), a thirteenth-century work with central pillar receiving the springing of the vaults, and the porches of Saint-Urbain of Troyes (Fig. 7), which are a little too cold in their perfect rest and balance, and, for its originality, that of Notre-Dame of Le-Puy-en-Velay, a sort of lower church over the steps that formerly led to the front of the choir, as from a crypt.

Fig. 8. Porch at Santiago de Compostela.

Abroad, porches are less common than in France; at least, no types have been created. The most remarkable examples of these constructions are individual productions. We may cite: in England, the porch of Exeter Cathedral, of the fourteenth century [see "*Gothique Anglais*," Fig. 35], projecting from the western façade and running across the entire breadth; in Germany, that of the Cathedral of Ratisbon [see "*Gothique Allemand*," Fig. 6], which is triangular, and belongs to the fifteenth century; those of St. Stephen's at Vienna [see "Austrian Architecture," Figs. 4, 5, *American Architect* for November 8, 1890], of two different dispositions; of Santiago de Compostela (Fig. 8) and of San Vincente, at Avila in Spain, of the end of the twelfth century, etc. In Italy, either porches with galleries were maintained, to which type we must refer the famous porch of the Pazzi chapel at Florence, by Brunelleschi [see "Italian Architecture," Fig. 2, *American Architect* for December 12, 1891], or they were content with a strongly projecting arch borne on two isolated columns, a disposition which was introduced into Provence and Dauphiné, and which is well represented in the old Cathedral of Embrun.

Porches were of real importance in olden times. People gathered in them before or after service to discuss their affairs; they took refuge in them from the rain, or to await the opening of the doors; genuine courts were sometimes held there, a custom which was suppressed only under François I. In modern edifices, porches are almost wholly abolished, especially in country places, where, however, they would be of the most service, for the peasant likes to linger here with a friend on his way out of church, and the passer-by takes refuge here in stormy weather; then, too, the facilities which they offer for conversation prevent gossiping during service. Architects omit them from their plans for fear of masking the façades, which, however, could not be damaged by a well-conceived porch.

A. SAINT-PAUL and H. NODET.

CONCERNING THE AMERICAN STYLE.

Type I.

DURING the last ten years, discussions have occasionally arisen and articles have been written concerning the "American" style of architecture. Sometimes it exists only prophetically or conjecturally; sometimes it is full-grown and in the flower of its strength; sometimes it is in a state of peaceful decay; sometimes it is non-existent and from the nature of things can never be.

In endeavoring to describe as briefly as possible what seems to me the "American" style, there are one or two preliminary remarks concerning architectural styles in general, which, while neither specially striking nor at all original, are yet, like a great deal else of the same sort, rather necessary.

The architectural style of an age or nation must draw its inspiration from certain conditions, civil, political, religious, which dominate the time or the people. We turn to the country that has ever fought for and championed the Church, that has led in her crusades, that has furnished her with a temporary home, — we turn to France, and who shall say that the greatest architectural glory of France lies in aught but her cathedrals? And as Italy has from the beginning of the Christian era been the school of all things political, so we find there pre-eminent architecture political, be it that of oligarchy, of stern republic or of ducal tyranny. "By Roman architecture I do not mean that spurious condition of temple which has nothing more than a luscious imitation of the Greek. I mean that architecture in which the Roman spirit truly manifests itself, the magnificent vaultings of the aqueduct and the bath, and the colossal heaping of the rough stones in the arches of the amphitheatre; an architecture full of expression of gigantic power and strength of will." Thus Ruskin upon Roman "style," and a thousand years found the same conditions still present and under those conditions we find still that the true expression of architectural style is in the works of the body politic.

Walk up and down the narrow and crooked streets of Siena, streets walled with iron-bound palaces of brick and stone, battered by four hundred years of war and weather; stop in her Piazza del Campo, where the palace tower shoots heavenward and seems with the hurrying white clouds behind to be sweeping onward through space; look up at the city from the road just outside the Fontebranda gate, at the city wall as it climbs and dips and clings to the rugged slopes, to the grim tower-houses rising above their neighbors, to the cathedral and its tower and the palaces clustered about it — to the huge bulk of San Domenico and the ruined Fontebranda just below, where crowds of women soak and beat (I do not say clean) and dry their basketsful of clothes; all this as you see it, be it Siena, or be it any one of a score of other Italian cities, *this* is the Italian style of the fourteenth century.

And in England, that architectural expression which is most truly English is found, not in the castles, nor in St. Paul's, nor in the Houses of Parliament, nor in York, nor in Canterbury, nor Lincoln Cathedral, but in the smaller churches and in the homes of that

class which England claims as her bulwark of safety; in the dwellings, rural and suburban, of a middle class which lives and has lived since the time of the Magna Charta in a state of security of life, limb and property such as no other nation has enjoyed for the same length of time. In the dwellings of this class and in the churches built to a great degree by their efforts, we recognize a style of architecture which is surely characteristic.

Type II.

There is no need to generalize further. Let us get to America and look for her architectural style. And to know where to look, we have, of course, simply to pick out the American Idea, reduce it to its Material terms and see what the said Material Term, for his present shelter and abode and his future glory and exaltation, does devise, construct and adorn. The search for the Idea need not be a long one. We can throw aside at once the religious, the ecclesiastical idea. It would be a sad waste of the most worthless time to conjecture the possibilities of a style based upon the different beliefs held by the sixty millions of people, more or less, that we dwell among. We cannot find it among the very rich nor among the very poor — in every civilized and Christian land they are now much alike, and the slums of New York are but little dirtier than those of Naples, the miles of her brownstone fronts are as uninteresting as those of the corresponding quarters of London or Paris.

Can we find it in our Government works? Do our post-offices and our custom-houses express it?

In short, the American Idea seems to be personified in that class of citizens which America and America alone has brought forth; the class which is now in America universal and which is unknown outside the United States. The nearest approach to it is perhaps in the "lower middle class" and perhaps the "laboring class" in England; and it is, as in England, the class which contributes most to our strength and prosperity. A class analogous to this exists, of course, in every country, but nowhere under the social and political conditions that prevail here. Its possibilities are boundless, its ties with the very wealthy are often strong through church association or blood relationship, our facilities for cheap and rapid travel make it a most unsettled class (this point is a most important one), and it is without doubt relatively the most extravagant class which we have.

Here then we have an American type, original and universal. Manifestly, from what has gone before, the American style of architecture is to be found, if found at all, expressed by this class in the homes which shelter it, and so we will proceed, if you please, to glance at these homes.

There are two ways to do this: one, to take from two or three cities of each state in the Union a few sketches of the house of this type; the other to take an "average" city and thoroughly examine the architecture in that. The latter course is rather more practicable and I have taken that course, first assuring myself that the city may with fairness be called an "average" one from personal observation of cities of the same size from Maine to Louisiana southward, and by photographic acquaintance with many Western cities.

Type III.

So I have chosen a city somewhat over one hundred miles from New York and about the same distance from Boston — for it should be far enough from them to have a character of its own; of between forty and fifty thousand inhabitants; a city of varied manufacturing interests, but so situated as to have large trading interests as well; a city with the "modern improvements" of course; a city without a boom, but with "just a steady, healthful growth." Taking this city, then, there are obviously certain buildings which are to be thrown aside at once, and first of all those that are over twenty years old, for they were built before this class became a class universal and national. It was simply local then and even in its local range had not a tenth part of the attributes that distinguish it now. The very rich or the very poor, we shall find here in such small number that their work may be at once dismissed So it is to the houses built within twenty years costing from one to ten thousand dollars, that we must turn, and turning, what do we find?

We find, that the buildings executed under the aforesaid conditions are, for all practical purposes, alike in "style," that is, that ninety per cent of them can at once be grouped together (I am prepared to substantiate this assertion by figures if need be), and that they show an originality of design and arrangement of plan thoroughly in keeping with the necessities of their inhabitants.

Type IV.

Number 1 is the simplest and least expensive type — the germ. The houses of this degree resemble the sample so closely, that it may stand as a drawing of any or all of them. And yet, in detail and in color, you will hardly find two which are precisely the same. Then comes the next grade, which shows the same likeness (2), with a little more variation in plan as one, two or perhaps four families are sheltered under the same roof. It becomes a trifle more lavish in its allowance of front-porch and "art-glass" front door, but it is built with the same logical reasoning as regards the greatest amount of display with the least possible expense. A step beyond this and we reach (3). Here the latitude in plan broadens and here the variation in exterior treatment struggles to free itself from the bonds of its humble neighbor and grasps after the infinite, so to speak — struggles, but does not quite succeed. The porches are multiplied, the "art-glass" deepens its hues, dormers of varied shape break forth; towers — round, polygonal and square attract the eye; but the style is still sharply defined.

From this point upward (in point of cost) the examples rise, limited only by the imagination of man and the plenitude of his wealth.

In the accompanying sketches, no pains have been taken to select examples particularly pronounced; all of them are genuine and existing buildings, chosen from different sections of the city. Indeed so great is the multitude that to search for the most elaborate, the most imposing, the most tasteful or the one with the most "pleasing proportions," would be a long and exhausting task.

It only remains to determine if these examples express as they should the character of those who dwell within them, if they exhibit in their design the attributes of the typical American.

Look once more at the sketches, the simplest first. There is little if any, variation in the arrangement of the plans, for the necessities of life are to a great degree met in the same way. There is, if the house holds two families, a two-story porch, for each family must have one. They must be on the front that they may command a view of the "doings." That for the first story is generally the larger, but this is offset by the fact that it must be used as a thoroughfare by the dwellers upon the second floor. This porch is one of the universal characteristics of the style. It is varied in form, in (apparent) substance and in color, to an evidently unlimited degree. The tastes, the aspirations and the possibilities of those whom it shelters are as varied and unlimited.

Type III.

As the house increases in size, the rooms — nearly always the same — entrance-hall, living-room, dining-room, china-closet, kitchen and pantry, with sometimes a parlor, upon the first floor, increase slightly in size. The sitting-room has a "bay"; the neighbor extends his upward — he has a two-story bay (2). *His* neighbor continues the progression; *he* has a tower (3). The towers multiply; they must not be alike; "progress" is the American watchword — and the towers progress. This tower is perhaps the most "imposing" means to the end sought — that of acquiring a room of irregular shape; and is consequently in the greatest demand; but frequently the corners of the first and second story rooms are cut off at an angle of forty-five degrees, while the third story and its gable finish over the void thus left.

These are some of the points which give to the house its main

character, and these are the points which are determined by the social conditions of those that dwell in them. But the purely decorative portion of the house has as surely a character all its own. The scroll and the band saws, the turning-lathe and the ready-mixed paint catalogue have created new possibilities. I have counted four patterns of cut shingles, three patterns of turned baluster, three of turned post, various patterns of scroll-work and five colors of paint upon one house — a modest house too, so far as cost was concerned.

Now do not these houses, each with its bit of individuality expressed outwardly by some detail of tower, of bay, or of porch; of moulding, of shingles, or of varying colors — and yet in their *tout ensemble* as like as two dozen victims of the Geary law — do they not typify my personified American Idea? Are they not fitted to house the occupant's quartered-oak carved mantels, his plush furniture, the decorative painting of his offspring, his elaborate baby-carriage, his upright piano and his oxidized-silver piano-lamp?

My reasons for choosing the dwelling-house in illustrating the "American" style, have already been given; but it is inevitable that if this is truly a style it will affect to a greater or less degree buildings of all classes. And this it has done. The great mass of late work, except where some historic form or detail has been more or less directly followed, shows at once the mark of this American feeling.

The architectural history of our country is but a record of attempts to foist upon the free citizens of the most glorious nation on earth, copies of Old World architecture. For thirty years after our independence politically, we lived architecturally enslaved — bound to the chariot-wheels of Great Britian. Then came a short Greek revival; then a relapse to British Gothic; then a spasm of France, then a worse spasm of England once more, and since then, the nations of the earth have been ransacked to furnish matter of which to make, indiscriminately, our churches, our theatres, our houses, our depots, our stores and our schools.

But these attempts to dictate fashion to a free people have all proved futile. Why should we turn to the antiquated ideas of an effete aristocracy or an atheistic republic, and seek to adapt them to the unbounded needs and unfettered desires of this most glorious of all lands?

For the architectural style of our country, I repeat, we must trust to its people. Can we not trust them with it safely? What if certain individuals find fault with their architectural expressions, is the fault with the people or with the individuals? Surely with the latter.

For are we not the most cultivated, the most enlightened, the most highly civilized people on earth, in all that these words can imply? We are. Do we not teach the arts in all our public schools? Do not University-extensions swam, and Chatauquas abound, and summer-schools multiply, and lecturers hasten to and fro over the land, instructing us in these things? And are not these for all and every one in this glorious land? They are.

And why then, should not our style, our American style, be the best in all respects of any yet evolved?

I rest the case here. G. C. G.

LONDON

PRESENTATION OF THE ROYAL GOLD MEDAL. — THE SPIRE OF ST. MARY'S, OXFORD. — PROPOSED MUNICIPAL BUILDING FOR LONDON — THE FIRST WORK ACCOMPLISHED BY THE LONDON COUNTY COUNCIL AS ITS OWN CONTRACTOR. — THE EXAMINATIONS. — ST. BARTHOLOMEW'S, SMITHFIELD.

THE presentation of the Royal Gold Medal to Mr. R. M. Hunt by Her Majesty the Queen acting under the advice of the Royal Institute of British Architects, was made the occasion of an interesting ceremony. The meeting for presentation was preceded by a reception by the President of the Institute who subsequently delivered an address worthy of the occasion.

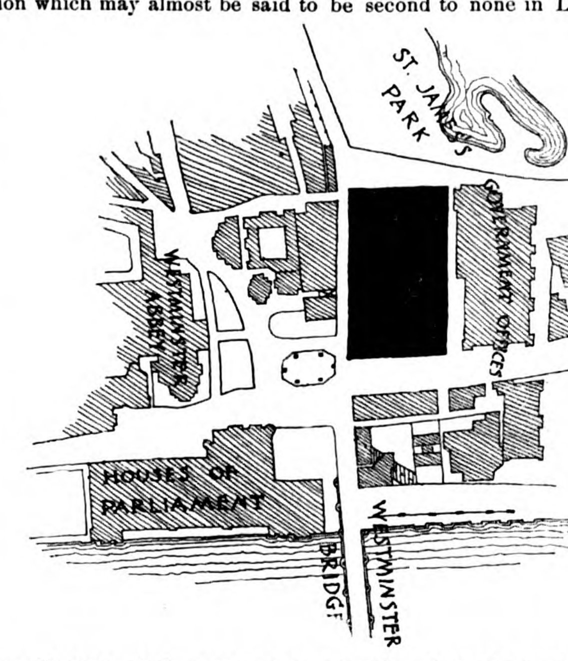
Mr. Macvicar Anderson opened his remarks by a reference to the fact that this was the third time he had had the privilege of presenting the Royal Gold Medal to distinguished architects. On the first occasion he presented the medal to an eminent English architect, Sir Arthur Blomfield. Last year he had been honored with the privilege of conferring the honor upon M. César Daly, the venerable Frenchman, who, at the age of eighty was still engaged in the study of his art. He had thus experienced the happiness of presenting this Royal gift to an Englishman and to a foreigner, but he felt some difficulty in determining the nationality of the present recipient of the honor. As an American he would scarcely be considered either an Englishman or a foreigner. And, whatever interest might have been associated with the forty-five eminent men on whom the Medal had been confered, the present occasion had no parallel and was unique; for they were about to do honor to a citizen of the great Western Republic, one whose name they were proud to enroll as one of their Royal Gold Medallists, not only on account of high personal and professional merit, but also because he was the first American whose name would appear in that roll-call of illustrious artists.

He felt that the selection of one who had designed the principal building in the great Columbian Exhibition at the present moment was a singularly happy circumstance, and in honoring Mr. Hunt in recognition of his eminence, he rejoiced to be able to pay a graceful tribute to the United States in the person of one of her most distinguished sons. The President then gave a brief account of Mr. Hunt's career, referring especially to Mr. Hunt's establishment of an *atelier* in New York. He then read letters highly complimentary to Mr. Hunt from the American Ambassador and from the President of the Société Centrale des Architectes Français and concluded by presenting the Medal in the following words: "Mr. Hunt, in presenting to you this Gold Medal, the gift of Her Most Gracious Majesty, Queen Victoria, I hand you what is the typical embodiment of the recognition by British architects of your distinguished and honorable career, and of the high architectural merit of your works. The fact that you have travelled some thousands of miles in order that you might personally receive this medal may be accepted as sufficient evidence of the high estimation in which you rightly regard the honor. It is indeed the highest which we are graciously permitted to offer to the most illustrious architects of the world, and we indulge the hope that our American brethren will recognize in this Royal gift which we are privileged to present to their most eminent representative the embodiment of the hearty good-will, the sincere respect, the ardent admiration with which they are regarded by the architects of the Old World."

Mr. Hunt in accepting the medal made most courteous recognition of the honor and gave the meeting some very interesting reminiscences of the work he did on the Louvre and the Tuileries and also to the Administration Building at Chicago. The meeting concluded after some interesting remarks by Baron H. von Geymüller and M. Paul Sédille eulogizing Mr. Hunt and his works and claiming a certain amount of honor for France, having regard to the fact that Mr. Hunt received a great part of his professional education at the École des Beaux-Arts.

The dispute about the restoration of the spire of St. Mary's church, Oxford, to which I referred last month was settled by referring the whole matter to a committee who have definitely placed the matter in the hands of Mr. T. G. Jackson. The effect of the various proposals for restoring the pinnacles is to be estimated by wooden models which are to be set up on the spire, and there is no doubt that this will enable the academic world of Oxford to decide which scheme they prefer.

An important proposal involving the erection of a municipal palace for London will come before the London County Council on Tuesday next. Since the administration work of London was taken over from the Metropolitan Board of Works by the County Council, it has almost doubled in extent and consequently the demand for office accommodation has become very pressing. Several fresh houses have been taken by the authorities for the housing of the Council's officers, but this was held to be very inconvenient and consequently the Establishment Committee were instructed to consider whether a site could not be obtained for the erection of municipal offices on an adequately extensive scale. Several propositions for sites were made, but the Establishment Committee rejected them all in favor of a position which may almost be said to be second to none in London for



magnificence. It is proposed to take the whole block of property between Parliament Street, Great George Street and the Government Offices. Whitehall would be continued at its existing width down to Great George Street, and the Hôtel de Ville would thus be erected

at the intersection of two magnificently wide streets almost opposite the Houses of Parliament and Westminster Abbey.

From an architectural point of view the project is to be in every way commended. The erection of a magnificent pile of buildings and the opening up of Whitehall in the manner suggested would be an achievement of which the County Council might justly be proud, but there are many other reasons, mainly of a political character, which seem to render it improbable that the proposal of the Establishment Committee will be carried out. In the first place a Royal Commission is engaged in considering how the City Corporation and the County Council can be united into one municipal body and it scarcely seems desirable to definitely settle the site of London's Government House until it is decided exactly what London is to consist of. In the second place the present Council has over and over again declined to carry out any improvements until the incidence of taxation has been altered from the occupiers of property to the owners. It scarcely seems consistent for a Council holding these views to spend three quarters of a million of pounds on a site for a palace for itself. Another unfortunate characteristic of the site, in one way, is its proximity to the House of Commons. There is a considerable jealousy of the Council in London and you will easily see that the idea of erecting a palace immediately opposite the Houses of Parliament is open to misrepresentation.

The comments of the daily press are interesting. The *Daily News*, our chief Liberal paper, writes: "It must be a matter of profound regret to every friend of the London County Council that the Establishment Committee have repeated their preposterous recommendation of the purchase of a site in Parliament Street for £750,-000. If the Council wish to make shipwreck of the Progressist cause they will follow the lead of this unwise committee. The proposal has nothing to recommend it but that vaulting ambition which o'erleaps itself and falls on the other side." The Conservative press may be exemplified by the *Daily Telegraph:* "There is no doubt a party in the Council who are anxious, not so much to secure merely an eligible site for an Hôtel de Ville as to insure the fixing of the headquarters in a particular spot. They are bent on putting their Council House in a line with the Government Offices and under the shadow of the Houses of Parliament. Doubtless they imagine that by so doing they would be able to bring more pressure to bear upon or even, perhaps, to overawe Parliament in dealing with Metropolitan matters. . . . The people of London would resent in the most unmistakable fashion a wanton, wasteful and arrogant expenditure upon no other object than merely swelling the importance of the County Council of the day." These brief extracts will serve to show how the proposal for an Hôtel de Ville is being met in London and from what I hear there seems to be little chance of the Council adopting the proposal of the Committee.

The first building erected by the Council with their own men and without the intervention of a contractor has been brought to a successful issue. The new school building at Crossness was advertised in the usual way and the lowest tender obtained from a contractor was £2,188. The estimate of the Council's architect was £1,688 and the work was actually executed for the sum of £1,662. The example, however, is on too small a scale to prove anything very much at present.

The programme for the new Final Examination to qualify for Associateship of the R. I. B. A. has now been published and has met with a very favorable reception. The examination has been extended in length and now occupies from Friday morning of one week till Saturday of the next. One important change has been the increased attention given to "Design." This is now made the first subject of examination and extends over two days instead of one, the subject being communicated to the student in general terms at the same time as his admission to the examination. The "History of Architecture" paper has been extended in scope and the student is now required to be present a longer period for examination than has hitherto been the custom. The other subjects of examination remain generally the same, though of a more difficult nature. The completion of the programme for the triple examination has established in England a course of training for young architects which can hardly fail to have good results. However we look at examinations in the abstract there can be little doubt that it stimulates closer attention to work and, therefore, if it is not administered in a too academic way it is likely to considerably benefit the English student of architecture.

The Prince of Wales has been very busy lately in laying foundation-stones and opening public buildings. One interesting ceremony consisted in the opening of a new north transept to the church of St. Bartholomew, Smithfield. This church was once a priory church of great importance, but after the Reformation it fell into a state of neglect, the nave was demolished and other portions were used for various secular purposes, until a fringe factory was erected right over the altar itself, borne by an iron girder. Some few years ago an attempt was made to remove these incursions and to restore the church to something of its ancient grandeur. Under the hands of Mr. Aston Webb the restoration has progressed until the choir and the transept are completed. The fine Norman proportions of the building are now disclosed and one can form some idea of the magnificent character the church must have had in mediæval times. Another building opened by the Prince of Wales has been the restored gate of St. John, Clerkenwell. There are not many gates remaining in London and it was a pity that this fine example should have been permitted to fall into disrepair. It now forms the headquarters of the Order of the Hospital of St. John of Jerusalem. The gatehouse was built in 1504 and has had a varied career. The restoration has been carried out in memory of the late Duke of Clarence.

It is not often that we get a Royal Princess for a sculptor, but this has been the case with regard to a statue of the Queen, that was unveiled by Her Majesty on Wednesday last, its sculptor being the Princess Louise. I have not seen the statue itself but all accounts seem to agree that it is an excellent piece of work and not at all of an amateurish character. The Queen is represented as she was at the time of her accession and the work has been erected near Kensington Palace where Her Majesty resided at that time.

Another building that has been opened during the past week has been the new Lunatic Asylum at Claybury. This is the largest lunatic asylum that has yet been erected in England and the appointments are most complete. It seems almost like a small town in itself. I gather from architect friends of mine who are more learned than I am in the details of lunatic-asylum planning, that this building is considered to fail on the side of over-development and that after a certain limit is passed, the aggregation of a number of lunatics in one building is liable to become cumbrous and expensive in working. This is said to be the case with Claybury.

A STUDENTS' COMPETITION FOR A MARKET-HOUSE.

Doorway in the Maximilianplatz, Munich, Bavaria. From *Architektonische Rundschau.*

IN general, the sketches seem to me an extremely nice lot, and drawn with cleverness. I would urge as a general matter, a closer study of old monuments rather than attempts at being modern, or original, or American. If you set out to adapt ancient work in your designs, you will wind up by changing it somewhat and making it more or less your own; therefore, by all means start from masterpieces as models and do not follow the passing fashions of the day as if they were the ultimate authority in architecture.

"*Oaha,*" (M. P. McArdle) placed first. Excellent plan, good arrangements for light and air. This scheme of open outside courts has many advantages over any scheme covered by one big train-house roof. As there was no requirement that the entire lot should be closed in, this plan, though for this reason somewhat extravagant, seemed to me to give the better result. The sketch for the outside offers plenty of chance for simple architecture, and gives a simple and interesting composition. The tower is the only one of the whole collection that seems to me to have suitable and appropriate character. It is rather a pity that this tower does not come in the centre of the long front, but there is no statement that the blocks of the city are regularly divided, and it is conceivable that this tower comes opposite the end of a cross street, which would make it all right.

"*Mercury,*" (J. C. Green) placed second. In the matter of symmetry this plan is better than the one placed first in the competition. It suggests that the blocks of the city are divided evenly, and the tower would then come in the axis of another street. The plan is sensible and well arranged. The position of the stable is good and the communications excellent. The exterior is certainly very satisfactory. It seems perhaps a pity to make so vast a building in a romantic and rather "picked-up" sort of style, but it has been cleverly done. The perspective is very well drawn. One would like to see the foot of such an immense tower; it does not look quite right springing from the flat roof of a low building. The tower itself seems well proportioned in elevation. It probably would have looked a great deal too big if shown in perspective otherwise than in parallel perspective. A square tower has to be studied both from the front view and the corner view if it is going to result successfully, and some sort of average has to be struck between what is best from these respective views.

"*A Designing Villian,*" (Oscar Enders) placed third. This seems a sensible sort of plan. It avails of all the ground, and would give a good and useful building. The walls that surround the building are designed in a way that seems very appropriate for the purpose, and besides this the *motif* would give an excellent opportunity for scholarly architectural detail. Probably not many people will care about the waving line of the big roof. The perspective is very well drawn and is one that should reproduce nicely. It is, however, a useful sort of perspective rather than a poetic or artistic drawing.

"*Festoon,*" (E. A. Crane). The aisles in front of the stalls in this plan seem narrow, and there is something lame in the change from the lower walls of the corner pavilions to the spring of their domes. The arcades surrounding the building, although expressed in a very few lines, have a good and simple Spanish air. When there are so many good Spanish Renaissance towers, both in Spain and in Mexico, it seems a pity not to have followed one of these more closely rather than to have attempted originality. A really thorough study and adaptation of one of those masterpieces would, it seems to me, have been more instructive and useful to this designer, and would have resulted perhaps in a better design. While the proportions of the tower are good, the detail is not particularly interesting.

"*Stoffe Italiano,*" (E. A. Manny). It is a pity with a plan so nearly symmetrical that the author could not have made it entirely symmetrical. As a picture, it would have looked better, and the requirements given for the plan are so elastic that he certainly could have made a plan fulfilling them all and yet arriving at symmetry. The scheme consists of five buildings separated by arcades. I should not think this scheme a very good one, for every one of the buildings will be full of walks between the stalls; and for the purposes of a market it would seem better to have people walk through these and among the stalls rather than through these outside covered walks. Each of the five detached buildings, however, are very good. They are nicely designed, and simple, refined and appropriate.

As a whole, however, the thing seems to lack coherence. In the front elevation the tower has a good scheme. A competition committee might be led to believe that a tower seen cornerwise will appear more slim than it does in the front elevation. Some birds, however, are too old to be thus caught. It would seem that this tower might have looked much better in the perspective if it had been drawn to really represent the one shown in the elevation.

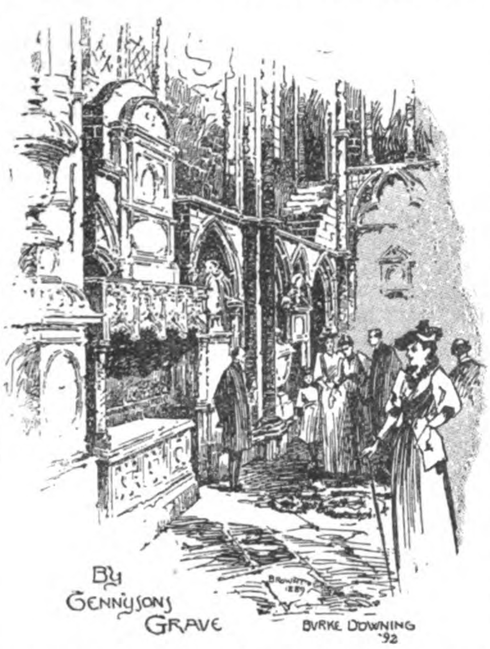
"*Fleur-de-Lis,*" (G. Stone). When a clock-tower is called for, it seems rather extravagant to build two simply for the sake of symmetry. There seems to be really no call whatever for the second tower. Nor is there any real occasion for the long galleries that lead to these towers. The plan does not avail of the land as would be the case in any real enterprise, nor does it gain by this omission enough monumental effect to compensate for this defect. There seems a little uncertainty as to the style in which the exterior is designed. There are flat, segmental arches, and very steep, pointed gables, and round-arched Italian-looking arcades. These are such varied *motifs* that it might be very hard to make them unite in working up the design. One cannot too often remember that, although it is harder, it is always safer and surer to tie-up to some established and authentic style rather than to try to harmonize the details of various different schools.

"*Market House,*" (Louis Mullgardt). This plan is rather puzzling in spite of the big circular central *motif*. It does not seem very well arranged for the bringing in of goods from out of doors; also it is difficult to see how the central portion under the big tower is to be effectively lighted. Small domes are shown over the entrances on each side of the big tower, and in the plan it is difficult to see where these go. Four clock towers for one building seem a good many, and one wonders what the big tower is for. The sketch is rather bright and sparkling, but if one had a market of this size really to do, we doubt if he would start with any such great monumental central *motif* as the one that forms the main feature of this design.

"*Palladio,*" (W. B. Ittner). Before signing his scheme with any such august name, the author of this sketch ought to look over a collection of Palladio's works, or study photographs of his buildings at Vicenza. Palladio doubtless had faults of coldness or formality, but what he did was polished and studied. Everything about his work was scholarly and just right of its kind. He might feel at home at seeing his name attached to an octastyle portico, but it is sad to think what his feelings might be if he found such a pediment stopped short and crowned by a large trainhouse-shed window without any intervening interval or break, and flanked by a tower having the proportions and the machicolations of the Palazzo Publico at Siena. The Palladian window in the top of the tower is a little tribute to his genius, but he certainly would not call it architecture to mix up many styles and *motifs* in this free-and-easy manner. It would seem to him trifling with serious things. I suggest as a prescription for this case a careful and thorough study of some fine Renaissance monument — a careful rendering, for instance, from a photograph of one of the tombs at the Badia in Florence, or of the Fra Giocondo building at Verona, that has arcades in the first story, or of the Palazzo Publico (I think it is) in Brescia, I mean the one with the arcades in the first story and the rich windows in the second, with the splendid ornamental frieze above them and the unfinished dome above that.

ROBERT S. PEABODY, *Judge*.

CONSTRUCTION OF WROUGHT-IRON CHIMNEYS.



SEVERAL specimens of this particular application of wrought-iron to the purposes of construction have been erected in England, of which we shall give a short account. For reasons to be subsequently stated, they are not viewed here with any very great favor by the authorities having the control of the building of such structures, although they are frequently used in France, Russia and America, to the exclusion of the older brick type. It would not be expected that the wrought-iron competitor would at once spring up to the full height, or anything even approaching to it, of its predecessors, assuming the height to be the standard dimension by which the magnitude and importance of chimney-stacks are gauged. In order to show the relative merits of brick and wrought-iron chimneys so far as their relative heights are concerned, we must briefly advert to a few of the highest brick chimneys as yet erected. The Townsend chimney-shaft at Port Dundas, Glasgow, is usually credited as the highest chimney in the world. It has a total height of 468 feet, a diameter at the base of 32 feet and at the top of 13½ feet, and weighs about 8,000 tons. Next in size comes the St. Rollox shaft, also situated at Glasgow, with a height of 456 feet, a diameter at the base of 50 feet and at the top of 13 feet. A shaft at Mechernich, near Cologne, runs these two examples pretty closely, being 440 feet in height. The base of this structure is square, with sides 39 feet in length, and the shaft circular, with a diameter at top of 11½ feet. It weighs about 5,500 tons. At the base, the Townsend chimney has a thickness of seven bricks and of one and a half at the top. For the St. Rollox chimney, the corresponding dimensions are 2 feet 7½ inches and 1 foot 2 inches. In both instances the batter is straight.

France claims to have the highest wrought-iron chimney yet built, and puts its height at 284 feet, acceding 276 feet to one in England at Darwen, in Lancaster, and 214 feet to another in America. Creusot is the site of the French *sans-pareil*, which can also boast of a couple more of the same class of erections. One of these is 196 feet in height, with a diameter at base of 10 feet, and 4 feet 4 inches at top. Like all structures of this lofty type, it is composed of a series of rings of wrought-iron plates, breaking-joint in a vertical direction and strongly and closely riveted together with lap-joints, very much like ordinary boiler-work. The thickness of the ring-plates varies from 0.094 to 0.438 of an inch. Its neighbor rises 276 feet into the air, and is similiarly constructed, the thickness of the wrought-iron plates varying from a quarter to half an inch.

If we assume, in accordance with the usual rule, that the diameter of a circular brick shaft at its base should range from $\frac{1}{10}$ to $\frac{1}{12}$ of its height, it will be evident from the examples quoted that the rule does not apply to shafts of wrought-iron, the proportions being nearly double these ratios. In both descriptions of chimneys the fire-brick lining is not supposed to add any extra strength to the building, and is not included in the thickness of the brickwork necessary for the stability of the structure. At the same time, it probably does augment the *vis inertiæ* of the chimney, of whichever material it may be built, and would thus assist in maintaining it in some degree against the wind-pressure.

This latter force is one which a chimney-shaft has a great deal to

fear from. It is usually considered, for all practical purposes, to exercise a uniform pressure at all degrees of elevation, and to act in a horizontal direction. The maximum pressure of the wind has been variously stated, and engineers and architects are by no means agreed upon the amount which should be allowed for, not only in the case of chimney-shafts, but of other constructions, such as roofs, bridges and large exposed walls or surfaces generally. The American engineers in many instances consider fifty pounds per square foot sufficient; but fifty-six pounds is about the maximum adopted by English engineers, although some maintain that as much as eighty pounds should be provided for. To estimate the amount of actual wind-pressure against a chimney-shaft we have Rankine's rule, which is to the effect that the total pressure of the wind against a circular or ordinary factory-chimney is equal to half the total pressure against a diametral plane of the chimney. One advantage, and a very important one also, of the substitution of wrought-iron for the older material is in the great diminution of pressure upon the unit of the foundation area, owing to the comparatively small weight of the iron superstructure. Most iron shafts are erected upon stone or brick bases or pedestals, although there are instances in which these latter have been dispensed with. A mean of six examples of large brick chimneys gives a pressure of six tons per square foot of foundation area, the maximum amounting to eight and one-half, and the minimum to three and three-fourths tons. Where the ground is bad or yielding, a wrought-iron chimney might be safely erected, when it would be very dangerous, or involve an excessive expenditure, to construct one of brick. It must at the same time be borne in mind that the base of an iron shaft is, relatively to its weight, not in the same proportion as the base of a brick shaft would be to its. In other words, if the weight is diminished, so also is the surface of the foundation, and it would be, theoretically, quite possible to design an iron shaft, which would exercise the same pressure per unit of foundation area as a brick one of the same height. Practical considerations, however, prevent this equalization of the two bearing-pressures.

In the State of Ohio there is an iron chimney 195 feet in height, which was riveted up *in situ* by successive plates, and has stood remarkably well ever since it was built. One of 160 feet high, among others, was put up in Russia, and after being riveted together on the spot, was raised by legs and pulleys to the perpendicular, and successfully planted on its pedestal. At the base the diameter was 9 feet 7 inches and 7 feet at the top, and the thickness of the plates 0.375 to 0.187 of an inch. A damp climate like our own is said to be not so favorable to the durability of a wrought-iron chimney-shaft as a drier one, such as prevails in some of the other countries where they have been employed. If, however, they are properly protected either by painting or other means, there is no reason why they should not be as durable as other examples of large iron constructions. It is possible that the heat traversing the interior may be a factor against which paint would fail to act as a protector to the material. We mentioned at the commencement of our article that the local authorities do not look favorably upon the erection of wrought-iron chimney-shafts. This follows from the fact that there are few rules or regulations to guide them, and that consequently they know very little about their design and construction. We are acquainted with a case in which the plans and drawings were carefully prepared for a wrought-iron chimney in London; but the consent of the local authorities could not be obtained, and the scheme had to be abandoned, as the promoters were unwilling to commence the erection of the structure, and so force the matter to an issue one way or the other. With the example of the Eiffel Tower before us, there is not the slightest doubt but that iron chimneys can be securely built of a much greater height than those to which we have drawn attention. The rapidity with which an iron shaft can be built, as well as the constancy of the work, compared with one of brick, is another advantage on the side of the metallic edifice. No stoppage is necessary in frosty weather, and while the foundations are being got in, and the pedestal constructed, if there should be one, the shaft itself can be riveted up at the same time. Iron shafts, moreover, are not affected by the numerous contingencies continually occurring to the brick specimens. There are few of the latter class which have not been "cut," in order to bring them back to the plumb, or as nearly as possible, for it is doubtful if there is a single brick chimney in the world the axis of which does not deviate in many instances very much from the perpendicular. It is said an ordinary stock brick will stand a temperature of 620° F. Wrought-iron will stand this and a great deal more. — *Building News.*

BOOKS AND PAPERS

IN looking through the pages of the recent work on Ventilation and Heating,[1] by Dr. Billings, and recollecting that the subjects treated in the bulky five-hundred-paged volume relate to what is after all only a single department of architectural practice, and recollecting also that the architect is supposed to be well posted about the subject even if not a past-master, one cannot but feel the immensity of the professional matters which nowadays are added to the requirements of that busiest of professional men, the architect; but after reading the volume attentively and considering the vast amount of detail which enters into it, the extent of exact scientific knowledge which it implies, one appreciates that however ardently an architect might wish to know it all, in these days of complicated life he can hope at best to be only a leader among specialists in so far as relates to the so-called practical details of his profession. It is hopeless to expect that in the rush of business life a single man could master fully and hold available for daily practice the amount of knowledge involved in the mastery of ventilation and heating, and it is still more vain to hope that, having once mastered such a subject, an architect would have the time to keep abreast with the changing views, the fresh data and the more recent researches which are constantly being put forward in these special lines. Certain portions of Dr. Billings's work have appeared in a previous work the "*Principles of Heating and Ventilation,*" issued in 1889; but the present volume is substantially new, with numerous illustrations of recent practice, many of them drawn from the pages of the "*Engineering Record*" in which the descriptions first appeared. As to Dr. Billing's ability to speak on the subject there is no question. He has made it a long study and is one of the best authorities in every sense, and while it is perhaps to be regretted that the volume is not more condensed, it is very difficult to draw the line and say what could be omitted without sacrificing the perfect illustration of the subject.

The works of Peclet and others which formed the basis for a large a portion of the theories upon the subject of ventilation and heating have ceased to possess the absolute value which was once assigned them. Indeed, it may now be said that within the last few years the whole subject has lost a great deal of its mathematical exactitude in theory, while gaining wonderfully in practical efficiency and in common-sense methods which are appreciated without reference to mere theories of the flow of invisible gases. The problem of ventilation resolves itself into the very simple one of supplying a definite portion of air to each individual under certain circumstances. Formerly it was considered sufficient to change the air in a room a certain number of times per hour. While in practice this may result in the same thing, Dr. Billings finds it better and more thorough to estimate upon the quantity of fresh air which each person under normal conditions will require, fresh air being understood to mean that which is supplied at a temperature of about 63°, with vapor and humidity 4.7 grains per cubic foot and the carbonic impurities due to respiration about 1.943 parts in 10,000 volumes. When the organic matter begins to be vitiated and the air is said to be "rather close," the vapor and humidity average 7.6 and the carbonic respiratory impurity 4.132 per 10,000. When the smell begins to be decidedly disagreeable and the air is called "close," the vapor and humidity average 4.9 and the carbonic impurities from 6.5 to 10, and when the carbonic impurity is 12 or over, it is "very close" and the air becomes oppressive and offensive. The conclusion is that under no circumstances should the carbonic impurities exceed 2 parts in 10,000, and this is the standard adopted by the most recent writers on the subject.

Having fixed upon a standard of permissible carbonic impurity due to respiration, it is a simple matter to calculate the amount of air required for each person in a large room. The amount of carbonic acid which is exhaled by a person during an hour varies both with the age and sex, as well as with the physical condition, men exhaling more than women and adults more than children, but a fair average of the amount of carbonic acid excreted per hour is for adult males from 0.6 to 0.7 cubic feet per hour, and for females 0.4 to 0.5 cubic feet per hour. Adopting 0.6 per cubic foot as a fair average for a mixed assembly and dividing this by .0002 or the amount of permissible carbonic impurity we have 3,000, which is the average of cubic feet per hour required for a person. This is an approximation which is for all practical purposes sufficiently close, but it is one which is probably never reached in ordinary practice as it is usual to estimate that a room is not to be occupied continuously, especially in cases of halls of audience. It is doubtful if there is a theatre in the world which has what might be called absolutely perfect ventilation. This would be impracticable and ruinously expensive, both in money and space. It is sometimes difficult to obtain perfect ventilation in a crowd, even in the open air, and the problem is much more complicated as applied to large halls of audience, in which it is almost impossible to fully ventilate every corner.

Perhaps the most practically available portions of the work are the very numerous and complete illustrations, including nearly all the best examples of heating and ventilation throughout the world. The plans and other cuts are specially to be commended for their clearness, and the thorough manner in which particular systems are illustrated so as to be made perfectly manifest. The illustrations are by no means confined to the stock examples which are found in so many of the older works on ventilation and heating. The new Sorbonne at Paris, the Music-Hall and the Metropolitan Opera-House at New York, the Pueblo Opera-House, Empire Theatre, Philadelphia, as as well as a number of very thorough instances of domestic work, are fully illustrated.

Dr. Billings states in the preface that his object has been to produce a book which should be useful to students of architecture and engineering, as well as of interest to non-professional men who may be interested in the more important subjects which he treats. While his volume perfectly elucidates the points which he discusses, and is

[1] "*Ventilation and Heating.*" By John S. Billings, A. M., M. D., New York: The Engineering Record.

thoroughly admirable in every respect as a work on heating and ventilation, we fancy that any one except a heating-engineer who would attempt to peruse the volume would feel so overpowered with the vastness of the subject that the first effect of the book would be to send the architect or the non-professional person immediately into the arms of the specialist, rather than to lead him to avail himself of the very complete information which the book affords. This can hardly be considered a defect; indeed, if the book should produce no other result than to convince the average architect that he should leave the matters of heating and ventilation as a rule entirely to specialists, it will certainly have accomplished a very important mission.

THIS volume,[1] as its title indicates, is a thoroughly practical hand-book of the construction and management of steam and power pumping-machines. Avoiding as it does any attempt to enter into the mere theory and mathematics of pump construction, it has a decided value for engineers, architects, contractors, plumbers, etc., who often are called upon to select pumping-machinery and are supposed to be informed on the subject of pump construction. It contains descriptions of all the standard pumps of every sort with very clear illustrations of pumping-machinery actually constructed and in use; and the entire absence of analytical investigation, while leaving the book less complete for the purposes of the hydraulic-engineer, greatly enhances its practical value to others. It would be manifestly unfair, therefore, to criticise a work which is itself so free from criticism and which confines itself so closely to tested and approved methods and constructions. It is thoroughly a hand-book, showing the reflex of the knowledge gained by the author's long experience, the good and the bad points of the various pumps being made manifest only by references to the broadest and most easily understood principles. It is a book which deserves a place in every architect's library.

There are probably few names connected with books that are better known to American architects than that of B. T. Batsford, who has sold thousands of pounds worth of old, new and second-hand architectural and art books to customers in this country. After carrying on his business for nearly forty years at 52 High Holborn, London, Mr. Batsford has just uprooted himself and his treasures and taken root again at No. 94 in the same well-known highway.

SOCIETIES

AMERICAN INSTITUTE OF ARCHITECTS.

THE annual convention of the American Institute of Architects is to be held on Monday, July 31st, and Tuesday, August 1st, 1893, to be followed by the International Congress of Architects on the subsequent days of the same week.

In addition to the papers already announced, one has been promised by W. W. Carlin of Buffalo, N. Y., on "Statutory Regulations," and one by R. Guastavino, on "Cohesive Construction in the past, the present, the future."

The order and time of reading the papers, as well as the other details of the convention, will be announced, after consultation with the committee of the International Congress, in the programme which will be issued for distribution some time during the week preceding the Congress, and can be procured at the Grand Pacific Hotel, the headquarters of the Institute during the convention; at the rooms of the Institute of Building Arts, 63 and 65 Washington Street, and at the office of the Director of Works, Jackson Park, as well as at the convention.

The Secretary expects to be in Chicago from the 24th of July, to the close of the convention, and all letters intended for him which are mailed after July 20th, should be sent to his address, Unity Building, 65th Terrace, Chicago, Illinois.

I must again urge upon each member of the Institute his duty to attend the convention, if it be possible for him to do so.

ALFRED STONE, *Secretary A. I. A.*

THE ILLUSTRATIONS

[*Contributors are requested to send with their drawings, plans and a full and adequate description of the buildings, including a statement of cost.*]

INTERIOR OF THE CROCKER–WALWORTH BANKING-ROOM, CROCKER BUILDING, SAN FRANCISCO, CAL. MR. A. PAGE BROWN, ARCHITECT, SAN FRANCISCO, CAL.

[Gelatine Print, issued with the International and Imperial Editions only.]

THE general finish of this room is in light Eschaillon marble, the pilasters and wall arcades are in black and gold while the ceiling is decorated in blue and gold. The counter is built of Numidian marble.

[1] "*Pumping Machinery.*" A practical hand-book relating to the construction and management of Steam and Power-Pumping Machines. By William M. Barr. Philadelphia: J. B. Lippincott Company.

SIX DESIGNS FOR A MARKET-HOUSE SUBMITTED IN A COMPETITION OF THE ST. LOUIS ARCHITECTURAL SKETCH-CLUB BY MESSRS. M. P. MCARDLE, J. C. GREEN, O. ENDERS, E. A. CRANE, E. A. MANNY, G. H. STONE, L. MULLGARDT AND W. B. ITTNER.

[Issued with the International and Imperial Editions only.]

FOR the judge's criticism, see elsewhere in this issue.

LIBRARY BUILDING OF THE NORTHWESTERN UNIVERSITY, EVANSTON, ILL. MR. W. A. OTIS, ARCHITECT, CHICAGO.

THIS building has a frontage of 160 feet, an extreme depth of 72 feet and when completed will have cost $100,000. The exterior is entirely of dressed buff Bedford stone with roof of red tiles. The frieze of porch bears the inscription "Orrington Lunt Library," since the building is due to the generosity of that gentleman. Mill-construction is used throughout and particular attention has been given to possible future additions, so that while the library capacity is at present only 125,000 volumes, the building may hereafter be expanded to meet the requirements of a library of 1,000,000 volumes. There is no book-stack, as all books are to be in cases seven feet in height, set directly on the floor, thus allowing attendants to reach every volume without the fatigue of climbing stairs. Under the windows, around the reading-room, are cases containing all the principal encyclopedias, lexicons and reference-books, directly accessible to all students.

FREEMASONS' HALL, ALLEGHENY CITY, PA. MESSRS. BARTBEGER AND EAST, ARCHITECTS, PITTSBURGH, PA.

THE "Freemasons' Hall" is now in course of erection. The first story will be faced with Cleveland stone, trimmings of the same quality of stone, and the second and third stories will be faced with a vitrified brick of a buff color.

DESIGN FOR A MEMORIAL ARCH, NORFOLK, VA. MESSRS. CARPENTER & PEEBLES, ARCHITECTS, NORFOLK, VA.

MANUAL TRAINING-SCHOOL, BROOKLINE, MASS. MR. A. H. BOWDITCH, ARCHITECT, BOSTON, MASS.

HOUSE OF H. W. BURGETT, ESQ., BROOKLINE, MASS. MR. O. F. SMITH, ARCHITECT, BOSTON, MASS.

[Additional Illustrations in the International Edition.]

STAIRCASE IN THE CROCKER BUILDING, SAN FRANCISCO, CAL. MR. A. PAGE BROWN, ARCHITECT, SAN FRANCISCO, CAL.

[Heliochrome Print.]

THE Crocker Building was erected by the Crocker Estate Co. at a cost of one and a quarter millions of dollars. It is thoroughly fire-proof and earthquake-proof. The building is finished in marble and mahogany throughout; it covers an area of about 12,000 square feet; eleven stories in height; and is situated at the junction of Market, Montgomery and Post Streets. Almost the entire first floor is executed in marble. The corridor is of light veined Tennessee; the columns and ceiling, panels of Pavonezza; all this marble work was executed by Messrs. R. C. Fisher of New York, and shipped around the Horn and set in place as prepared. For its size, the building is, possibly, the most expensive and best finished of any building outside of Boston or New York. The exterior of the building is of Roman brick and terra-cotta, — the first two stories are of light granite.

STAIRCASE FROM FIRST TO SECOND STORY OF THE CROCKER BUILDING, SAN FRANCISCO, CAL. MR. A. PAGE BROWN, ARCHITECT, SAN FRANCISCO, CAL.

[Gelatine Print.]

THE QUEEN'S HOTEL, OLD COLWYN, DENBIGHSHIRE, ENG. MESSRS. J. W. & R. F. BEAUMONT, ARCHITECTS, MANCHESTER, ENG.

THE Queen's Hotel, Old Colwyn, was built by Mr. George Napier on the estate belonging to the Old Colwyn Land and Building Company. The hotel contains large dining-room, drawing-room, smoke-room and billiard-room on the ground floor, and a large number of bedrooms and sitting-rooms on upper floors. The site is on the side of the hill, and commands excellent views over the sea and along the coast towards Llandudno and Penmaenmawr. The work is carried out on the street base to level of ground-floor and above with Ruabon facing-bricks; the upper stories are constructed with timber-facing filled-in with cement panels, and the roof is covered with red tiles.

CHURCH OF ENGLAND SOLDIERS' INSTITUTE, WOOLWICH, ENG. MESSRS. NEWMAN & NEWMAN, ARCHITECTS, LONDON, ENG.

THE illustration we publish this week is of the new Church of England Soldiers' Institute, now being erected at Woolwich. The principal entrance opens into the staircase hall, on the right of which is situated the bar, 44′ x 15′, with a separate entrance from the road, and kitchen and servery in the rear; and on the left are two private

rooms and a large billiard-room. In the basement the accommodation comprises a large room, 30′ x 16′, to be used for devotional purposes, the secretary's office and the scullery, with lift, larders, stores, etc., together with heating-chamber and coal-cellar. On the first floor is placed the large concert-hall 54′ x 26′, with retiring-rooms and separate staircase to same at back of stage, and the library, 30′ 9″ x 16′ 6″, with music and writing rooms, are in the eastern end of the building. Eight bedrooms are planned in the attics. The hot baths, lavatories, etc., have been placed in the western portion of building with a separate entrance to the road. The exterior of the building is faced with red bricks, with red Dumfries stone sills and dressings, and the roof is covered with green Westmoreland slates. The total cost of the building will be 5,083*l.*

WURZBURG.

COMMUNICATIONS

[*The editors cannot pay attention to demands of correspondents who forget to give their names and addresses as guaranty of good faith; nor do they hold themselves responsible for opinions expressed by their correspondents.*]

INFORMATION WANTED.

PHŒNIXVILLE, PA., July 13, 1893.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — I have been questioned several times from Europe, concerning a building-material already used for some time in the United States and England, and is to be introduced in different other countries. They stated, the iron framework erected, they fill the walls up with the new material, which is said to be fifty per cent cheaper than bricks, is worked quickly, fireproof and water-tight and by its extreme dryness gives the healthiest rooms.

As I don't know anything about such a material you would much oblige me answering in your valuable columns.

Yours truly, DR. THOMAS DELMAR, C. E.

[PERHAPS some of our readers may recognize the material to which this imperfect description relates. We do not. — EDS. AMERICAN ARCHITECT.]

NOTES & CLIPPINGS

INSURANCE AND THE ELECTRIC HAZARD. — Commenting upon the present situation in fire underwriting, the manager of a large company said a few days since, that the business had been so unprofitable thus far this year that but few of the companies could, even under normal conditions, hope to make good their losses during the remainder of the year. He said that the managers were unable to devise any means for remedying the conditions, as the fire-losses seem to be unpreventable, and what are regarded as good risks are burning on all sides. There have been many improvements in the methods of conducting the business, he said, and better practices prevail now than in several years, but the increase in losses more than counterbalances the premium receipts even under the better practices. The gentleman referred to attributed the large increase in the number of fires to that insidious incendiary, electricity, that is now coming into such general use for power and lighting purposes. The wires conveying this dangerous element are found everywhere, crossing the roofs of buildings and permeating their interiors, where they are strung about without regard to the fire-hazards thus introduced. A safe and economical method of insulating the wires, if discovered, has not yet come into general use, and underwriters are well satisfied that a large number of fires originate from broken insulation or imperfect wiring. Inspectors of electric installations are apt to do their work in a perfunctory way, so that imperfect workmanship frequently receives their official approval, and the companies in consequence assume risks of which they have no knowledge. Indeed, so little is known regarding electricity that it is doubtful if even the best electrical experts can fully provide against its dangers or if they even know them. It has been suggested that there should be organized a National Bureau of Inspections, under the supervision of underwriters, and that experts in all classes of fire-hazards should be employed to inspect risks in all parts of the country. This would necessitate the employment of a large army of inspectors, and how to direct and handle them would be a difficult problem to solve. But there is no reason why fire-underwriters should bear the cost and burden of such a bureau; every community should have one of its own, supported at public cost. Every citizen is interested in the protection of property, and whatever conduces to that end should be provided, the same as police and fire protection are provided, at public expense. In New York City there is a building-department that might be clothed with sufficient additional powers to enable it to make inspections at least of all electrical installations under the directions of an expert. It might be worth while for the underwriters to secure legislation to this end at the next session of the legislature. In several cities a fire-marshal has been empowered to make house-to-house visitations at intervals in search of fire-hazards, and the results have been most satisfactory. But underwriters have found it less trouble to assume for themselves burdens that should be carried by the general public than to unite to secure proper legislation in regard to them, especially in the protection of property, as, for instance, the maintenance of fire-patrols. We venture to say that if all the fire-patrols were at once discontinued they would be immediately taken up by the different municipalities and added to the fire-departments. So, combined effort to secure the authorization of public fire-inspection departments would undoubtedly secure the desired end. — *The Spectator.*

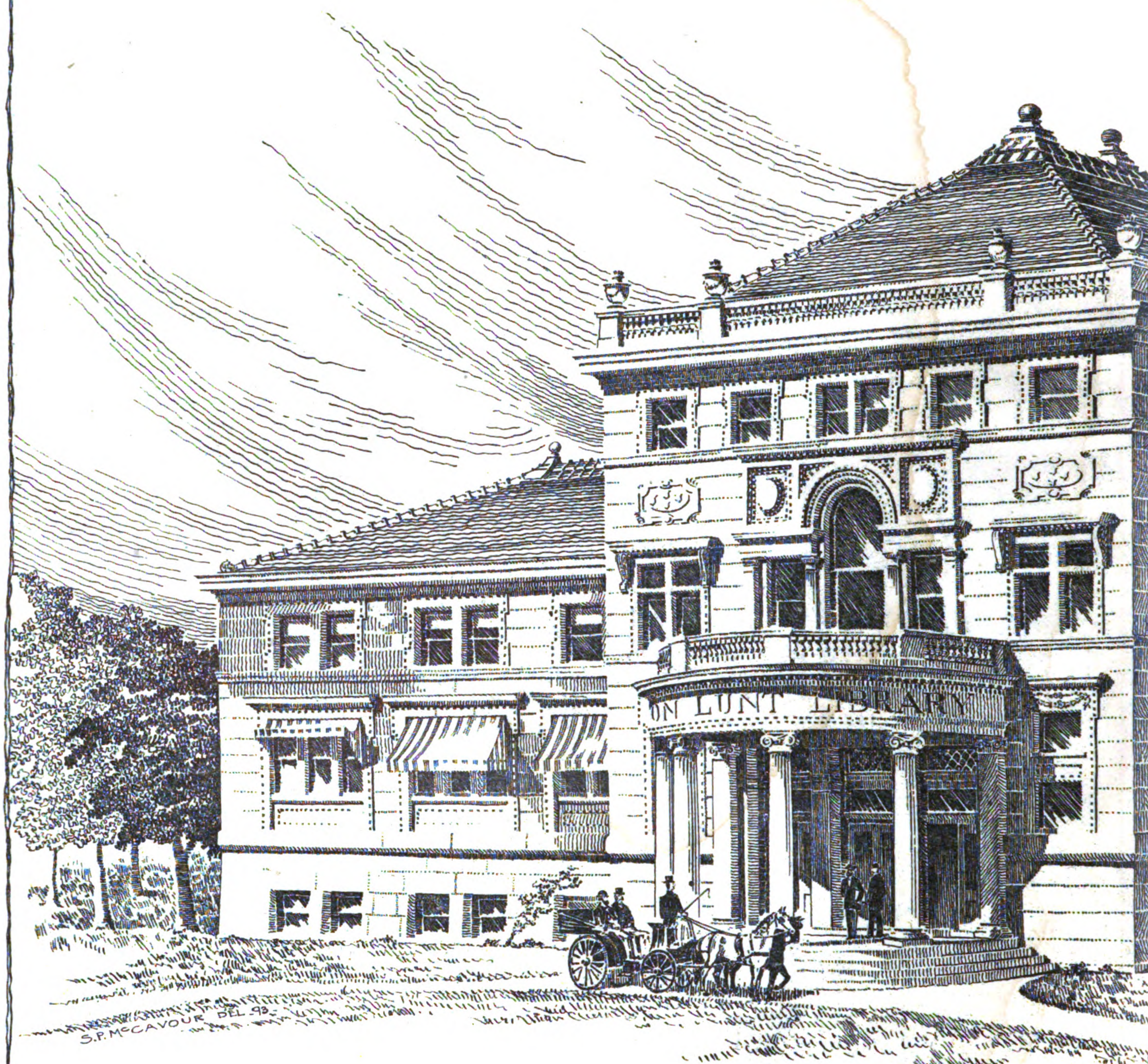
COPPER-PLATING FOR BUILDING PURPOSES. — Builders and others have lately been interesting themselves in the copper-plating of sheet zinc for building purposes. This has recently been tried, according to a German contemporary, with considerable success, and the process is especially recommended where mechanical wear takes place, the zinc combining very well with the copper. The zinc may be coated with copper by ordinary means, but the electrolytic method of copper-plating is found more advantageous. — *Invention.*

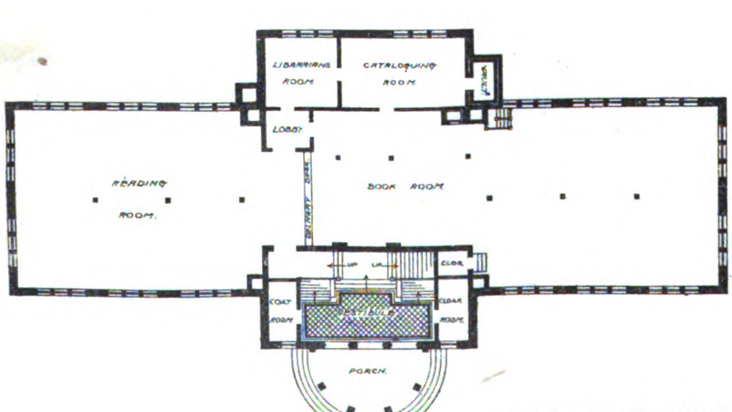
TRADE SURVEYS

THE situation has not improved, despite the universal whistling of the newspaper press that a general improvement is in progress — a fact disagreeably familiar to every business man. Nor is any immediate improvement probable, and for these reasons: the public doubts, first, the early repeal of obnoxious legislation, and also have doubts, even if a repeal is effected, that the promised good will come. The papers are full of statistics of banking, railroad-traffic and general business, all of which are as favorable as could be expected; but the fundamental conditions are wrong, and the common-sense of the business public recognizes that something else than mere legislative acts are necessary. In all the commotion of the past few months, no practical suggestion has ever emanated from business men, except to re-echo the demand of the banks. The editorial treatment of the issue before the people is monotonous and superficial. The fact is overlooked that the country is passing out of one growth into another, and that a new set of conditions is being built-up around all nations. It is these conditions that demand something different, and the fact and force of these demands is becoming more apparent every day. The momentum which the industries have acquired has carried them, so far, successfully over and through a serious monetary stringency. Even now, the gathered energy is greater than at the outset. The volume of industrial capital was never larger, the volume of debt with relation to the capital invested in our industries never as light, the opportunities for future investment never better, and this, too, in the face of smaller profits than were ever experienced. This is no rash statement, but, flattering as it is, it possesses some elements of weakness as well as of strength which are not always recognized in the counting-rooms of bankers, merchants and manufacturers. One element of strength not recognized is that the consumptive capacity of a people — ours, for instance — can, under wise management, be greatly increased. The weakest spot in our domestic economy is that labor and enterprise is forced to ask permission of men who stay in glass cages or behind wire screens for permission to develop wealth in more bounteous measure. The solution of this new problem will probably engage the best talent and greatest energies of the people for the next decade. The masses have had a taste of luxury, and they will not permit the instruments whereby they believe it has been gained to be wrested from them. Herein will lie the strength of the popular movement for different conditions and methods in our future domestic economy. The volume of business for the past week shows a slight expansion. Buyers, especially the great body of small country buyers, have taken cognizance of existing abnormal conditions to the extent of carefully limiting their purchases to the assured demands of customers for the next thirty or sixty days. Jobbers speak of this custom of small purchasing, and rather favor it, because it is a step in the direction of a cash basis. This class of people are heartily in favor of a currency of small notes and of silver, as they know by experience that payments to cross-road stores are then more prompt. The manufacturing industries, generally speaking, are in a healthy condition. The production of crude iron has declined 20,000 tons, and there is promise of a still further curtailment. Steel production has been temporarily reduced. Textile production is less than in the earlier months, but, at the great textile centres, confidence in a heavy demand, based on an actual knowledge of market requirements, is deep and general. Late advices from many Southern cotton-mills are very favorable indeed, and more factories are to be built. Cotton and woollen goods, according to good authorities, cannot decline in price, except at the cost of restricted output, which would immediately react. This statement covers the case. The hosiery and knit-goods situation is about the same. Serious labor troubles are threatened in English textile mills. English exporters of textile goods expect a full trade this year. Advices concur in the statement that there will be an average cotton crop. Stocks of all kinds of textile goods at home are of moderate proportions. In the building-trades, advices this week are contradictory. In some cities less work is now being done; in others, the undisputed statement of good authorities is that, so far, there is an increase over last year. The financial depression has not reached the class of people who rent and buy average-sized dwellings. The construction of lines of quick locomotion to suburban districts will offset other restraining causes, and give an impetus to suburban building. This tendency is quite evident in larger towns. The lumber trade is quite active; so is the demand for building material, including iron, that enters into most kinds of construction. While the industries are well organized and a good many trusts exist, their cohesiveness is not of such a character to do much harm to the public or much good to the stockholders. Industrial conditions in Great Britain cause manufacturers a good deal of concern. Demands for shorter hours and higher wages, in the face of European competition for the outlying markets of the world, occasion much apprehension, but the work-people are relentless and obdurate as to the arguments used by their employers against these demands. On the Continent, there are lights and shadows, but, measuring this year with last, there is no cause of complaint. Much new engineering work is promised in Egypt, Asia and elsewhere. In fact, the newer countries of the world are now depended upon for a very considerable share of the work which keeps the wheels turning in Central Europe and Great Britain. The controlling spirits are making great efforts to correct the mistakes of rash investments throughout the world, so that avenues of investment may be again opened under conditions that will command popular confidence. In this new movement, the missionaries have to stand aside to make room for the drummers for trade.

S. J. PARKHILL & Co., Printers, Boston, U. S. A.

AMERICAN ARCHITECT AND B





PLAN OF FIRST FLOOR

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EVANSTON, ILL.

READI

ORRINGTON LUNT LIBRARY.
NORTHWESTERN UNIVERSITY.
EVANSTON, ILL. W. A. OTIS, ARCHITECT
CHICAGO, ILL.

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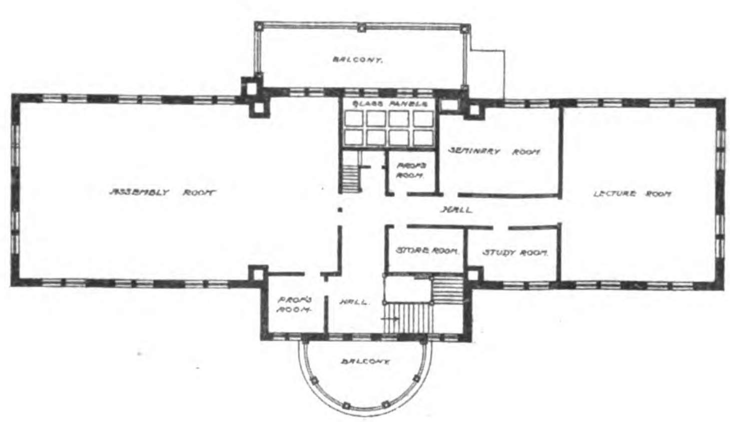
W. A. OTIS, ARCHITECT.
CHICAGO, ILL.



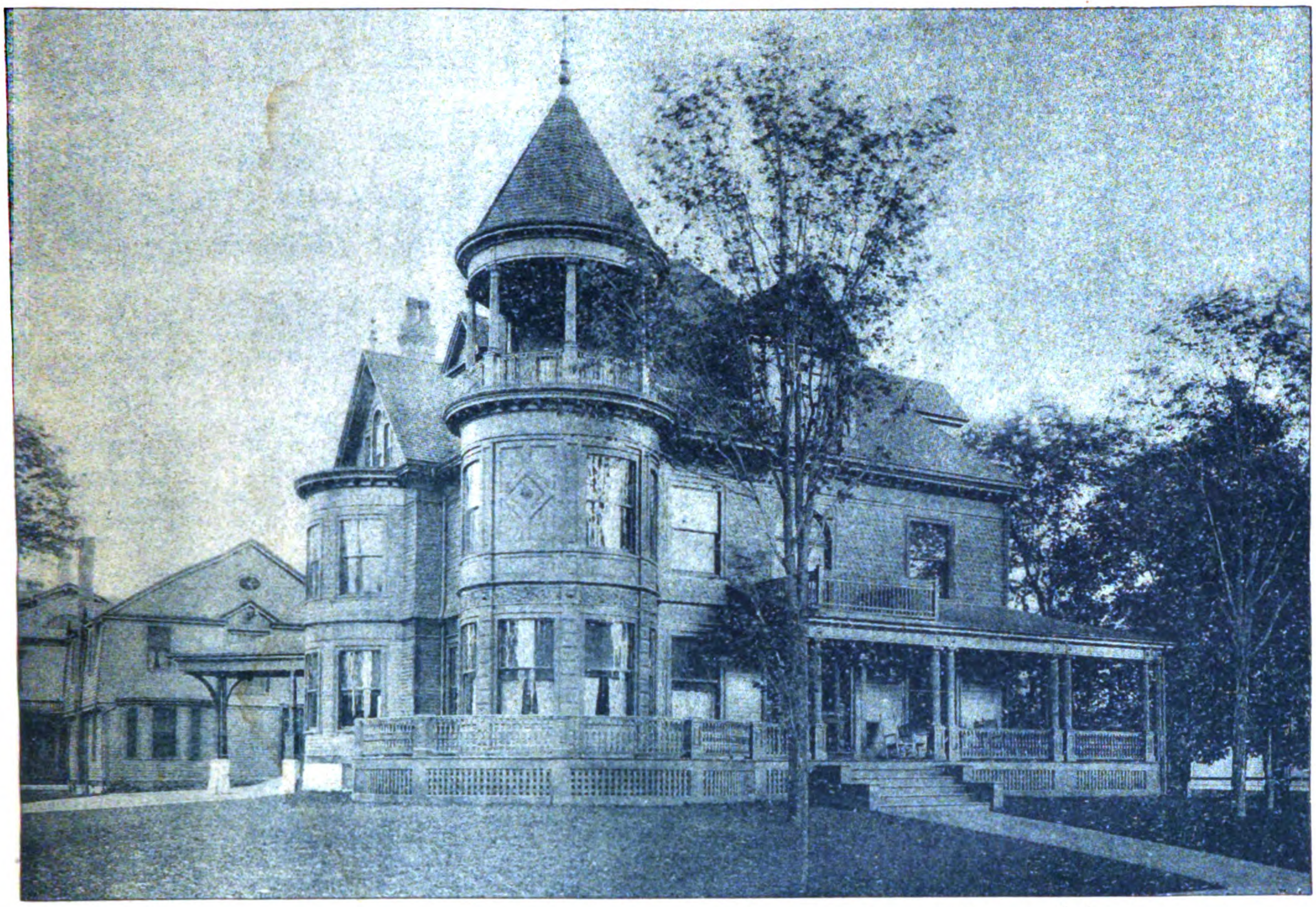
PLAN OF SECOND FLOOR

No. 917. American Architect and Building News, July 22. 1893.

Freemasons Hall
Allegheny City, Pa.

Bartberger and East, Architects.

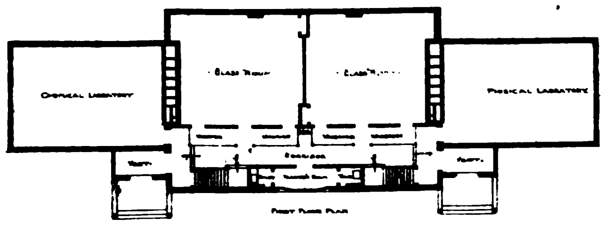
HELIOTYPE PRINTING Co, BOSTON

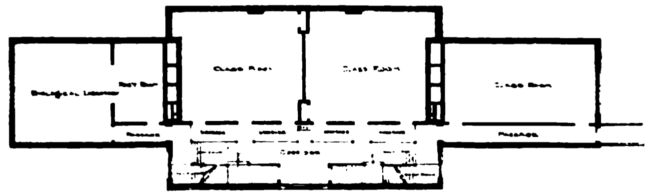


House of H. W. Burgett Esq. Brookline, Mass.
O. F. Smith Architect.

Memorial Arch Norfolk, Va.
Carpenter & Pe

AMERICAN ARCHITECT AND B





MANUAL · TRAINING · SCHOOL
BROOKLINE · MASS. · 1893
A · H · BOWDITCH · ARCHT · BOSTON

HELIOTYPE PRINTING CO. BOSTON

THE AMERICAN ARCHITECT AND BUILDING NEWS.

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JULY 29, 1893.

CONTENTS

EVERY architect, and every one who has the good of his fellow citizens at heart, must mourn the loss of Colonel R. T. Auchmuty, who died at Lenox, in consequence of an amputation made necessary by a painful disease of the leg, from which he had long suffered. Colonel Auchmuty was a grandson of one of the first rectors of Trinity Church in New York, and was throughout his life identified with that church and with the charitable and religious undertakings connected with it. He served in the army during the Civil War, retiring with the rank of colonel. He was educated to the profession of architecture, and was for some time a partner of James Renwick, the architect of Grace Church, but, being possessed of an independent fortune, and finding ways in which he could be of more use to his fellow men than in the practice of his profession, he came of late years to devote himself entirely to his various charitable works, of which the greatest was that of the establishment of the New York Trade Schools. From the time of his first acquaintance, through his professional work, with mechanics of the old and new schools, Colonel Auchmuty had observed the unfavorable effect upon the younger men of the limitation or abandonment of the old apprenticeship system, and the substitution, for the instruction and control of the masters, of the tyranny of trade-unions. In New York, as in other large cities, the unions are almost completely under the control of foreigners, who favor their compatriots, to the exclusion of the native-born, and Colonel Auchmuty found his young fellow-countrymen not only shut out of employment in New York, to make room for foreigners, but prevented from learning a trade which they might practice elsewhere, by the limitation of the number of apprentices in the shops, rigorously enforced by the unions, and the absence of any other provision for training them. Finding that the same difficulty had been met abroad by the establishment of schools, under Government patronage, for teaching the manual arts, Colonel Auchmuty determined to see whether something similar could not be done in this country by private effort, and, securing a small building in New York, he employed instructors and opened a school where young men could be taught carpentry, masonwork and house-painting. The school was not free, a small tuition-fee being charged, and there was every year a deficit to be met, which Colonel Auchmuty and his wife paid. The first year the school was small, but it grew rapidly. Not only was practical workmanship thoroughly taught, but theoretical instruction was given in the properties of materials and elementary statics, and drawing was taught to all the pupils. Very soon, the school increased so much that it was necessary to erect new buildings, which were constructed by the pupils. New courses were added, and the school now has about six hundred pupils, of the best type of American adolescence. It is hardly necessary to say that an institution which taught young men to work and think excited from the first the hatred of the organizations which look upon anarchists as the true labor-reformers, and the walking-delegates tried open violence, as well as their arts of secret terrorism, to destroy the schools. Finding that the schools could not be closed by these means, they closed the shops against the graduates of the schools, ordering every shop "struck" that employed one of them. Colonel Auchmuty met this step by resuming his old profession, and making plans for a considerable number of buildings, which were carried out by the school graduates. After this, the labor organizations, finding that they had aroused a public feeling which it was advisable to allow to subside, ceased active hostility, and the relations between them and the trade schools, though far from cordial, are not now belligerent. On being attacked by the ailment which finally caused his death, Colonel Auchmuty was obliged to leave the work of managing his schools mainly to others, greatly to his regret, but, as he himself said, this has proved a certain advantage, as their continuance is in that way better assured, so far as the system of instruction is concerned, while they were recently firmly established financially, by the generous endowment of half a million dollars, presented them by Mr. J. Pierpont Morgan. Before his death, Colonel Auchmuty, with his wife, added one hundred and sixty thousand dollars to the endowment, this being outside of the seventy thousand dollars which they had already devoted to the schools.

IT will be remembered that, a few years ago, a certain Dr. Cogswell, of San Francisco, we believe, made to the City Government of Boston, as he already had to other municipal bodies, a proposition to erect on the Common, and present to the city, a fountain, consisting of a bronze figure, sheltered under a classical pavilion of granite, and furnished with an appropriate pedestal and inscriptions. No conditions were annexed to the offer, and the gift was accepted, and the fountain and pavilion duly erected on the Common. The site assigned to it was not a happy one, and the structure itself, although tolerably well executed, did not please the educated taste of the citizens, while, the name of the donor being rather conspicuously displayed on it, an idea became current that it was intended as an advertisement of the donor's business. However that may have been, the popular dislike to the affair became so marked that, after four or five years, the City Government appropriated money to have it removed.

THE connection between this story and another which we are about to relate will not at first appear, but a careful comparison of the circumstances will, we think, disclose certain curious coincidences. The second story is this: Some sixty years ago, great preparations were made for the erection of a monument over the grave of Mary Washington, at Fredericksburg, Virginia. The pedestal was in place, and an elaborate work of art was in course of execution, portions of it, indeed, being actually on the ground, when the proceedings came to a sudden halt, and were never resumed. Occasionally, a traveller visited the Fredericksburg cemetery, and was astonished to find the grave of the mother of Washington marked by some dilapidated masonry, and a piece of a monument, lying on the ground, and overgrown with weeds; but nothing was done about it until 1874, when the State Department at Washington sent an engineer to examine the condition of the structure. He reported that it was a hopeless ruin, and of no practical value. The State Department did nothing further, and the matter rested fifteen years longer, until, in 1889, some influential people in Washington proposed the formation of a National Mary Washington Memorial Association, to raise funds for commemorating the mother of the greatest of Americans by something better than an unfinished ruin. The new Association, of which the wife of Chief Justice Waite was, and still is, the President, while many of the highest officials of the Government are members, went to work quietly, but efficiently, and raised in four years something like fifteen thousand dollars. With this sum it was resolved to commence the work, by erecting a granite obelisk, fifty feet

high, on a rather simple pedestal. This could be done for eleven thousand dollars, and it was decided that further subscriptions should be solicited, until the total sum raised should amount to twenty-five thousand dollars, and that the balance remaining, after paying for the monument, should be invested, as a permanent fund, the income of which would provide for the care of the monument and the surrounding ground. About the time of the formation of the National Association, the people of Fredericksburg itself became fired with a sudden zeal, and formed a local Mary Washington Association. It does not appear whether they had raised any separate fund before it became evident that the two bodies could work best in harmony, and the Fredericksburg Association became an auxiliary to the other, each doing its best for the common purpose.

EVERYTHING went on smoothly until very lately, when the design for the obelisk, which had been approved by the National Association, was sent to the Fredericksburg auxiliary. Architects know well that a sketch is apt to act the part of a firebrand in a body previously peaceful, and the present case seems to have followed the general rule. The design was characterized as "cheap and insignificant," while the obelisk on its pedestal was likened to "a lead-pencil stuck in a biscuit," and the Fredericksburg people held a meeting and formally asked for a year's delay, in order that they might increase the fund to one hundred thousand dollars. Pending the collection of this sum, they had a design prepared for the monument on which it was to be expended, consisting of a column supporting a colossal angel, and surrounded by fountains and other ornaments. The National Association consented to wait a year, while the Fredericksburg people were taking in the extra eighty-five thousand dollars, but suggested, very innocently, that, so long as there was an assured prospect of doing something at the end of the year, it might be well to improve the time by clearing away the decayed remnants of the previous abortive attempts at a monument. The authors of this proposition evidently forgot that Virginians depend more upon soaring eloquence than on local applications of such base mechanical tools as lawn-mowers and trowels to impart the proper charm to their decrepit gravestones, but their oversight was immediately corrected by a burst of indignation from the Fredericksburg newspapers. "A thousand historical associations," they were told, "cluster about the base" of the old monument "and swarm around its summit." "It has been baptized amid the fires of war, and has brooded over the death of heroes." "And now," they were told with bitter scorn, "comes an association of ladies, in the name of the women of America, and proposes to tear away the vestige of this classic ruin, and to replace it with a garnished monument, built avowedly more for their own glorification than as a tribute to the memory of her who sleeps beneath it." A critical examination of the metaphors in this fervid passage will show how deep must have been the pain inflicted on the editor of the Fredericksburg paper by the heartless suggestion of the Washington Association, but there is an inconsistency between the complaint of the Fredericksburg meeting that the monument proposed by the National Association was "cheap and insignificant," and the subsequent agony of the local editor over its "garnished" design, that even mental distress does not account for, while the much more "garnished" structure that the Fredericksburg people professed to be raising money for is not mentioned at all. Keeping in mind the various Cogswell fountains, it will be found interesting to hear some more Fredericksburg eloquence. "No stone of this ruin," the editor went on to say, "should be touched. No vandal hand should remove one piece of it. It should stand forever as it is, a memory of her whose virtues it commemorates. Over it should be erected, from the beautiful granite of the hills around it, a temple open on four sides, of simple design and graceful structure." "On its walls should be hung a tablet, reciting that the women of America or of Fredericksburg have in that enclosure enshrined those ruins as they have preserved in their hearts the memory of the virtues of her who sleeps beneath." "The National Mary Washington Association should be notified that these ruins will not be touched, and that if they see fit they can erect their monument for their own glorification elsewhere. Then let the home association accept the offer of the gentleman who proposed to give ten thousand dollars if he be permitted to be the sole contributor. With that fund put up some such structure as we suggest, and cease to vex the ghost of the sainted dead with unseemly controversies over her tomb." We need hardly add that the National Association, dumbfounded at the reception accorded to its proposal, has abandoned the field, and will probably erect its monument near the tomb of Augustine Washington, at Wakefield, where the early married life of Mary Washington was passed, and where her husband and infant daughter are buried, leaving the Fredericksburg people and their benefactor to deal with her actual grave as they like.

PERHAPS some of our readers who know a little of photography may be inclined to amuse their leisure hours by experimenting in color-photography. The most recent process, and one which promises important results, is that first suggested by Professor Lippman, but since greatly improved by others. In this process, unlike the Ives and similar methods, one plate only is used. This is made sensitive to rays of all colors, and the picture is reproduced upon the plate itself in iridescent colors, which, according to Professor Lippman, are due to interferences of the rays reflected from the film, the thickness of texture of which is modified by light of different colors. According to *Le Génie Civil*, the brothers Lumière, of Lyons, manufacturers of a well-known brand of dry-plates, and chemists of great skill, have reduced the new process to definite formulas, by which good results can be obtained with tolerable certainty. As treated by them, the chromatic plates give admirable copies of water-color drawings, as well as beautiful photographs from nature. To produce these pictures, a long exposure is necessary, varying from two to thirty minutes, where a thousandth part of that time would probably be sufficient for an ordinary photograph; but there can be no doubt that further experience will show how the rapidity may be increased.

THE LUMIÈRE BROTHERS prepare their plates in the following manner: Three solutions are made, one containing 20 parts by weight of gelatine in 400 parts water; the second containing 2.3 parts bromide of potassium in 25 parts water, and the third containing 3 parts nitrate of silver in 25 parts water. Distilled water only should be used. The nitrate of silver solution must be mixed with half the gelatine solution, and the other half of the gelatine solution is added to that containing the bromide of potassium. The two portions of liquid are then mixed, in a perfectly dark room, adding a small quantity of erythrosine, cyanine or methyl violet. After thorough mixing, the emulsion thus formed is filtered, and spread upon glass plates. As the precipitated bromide of silver is filtered out, the emulsion, when ready to spread on the plates, will be transparent. The temperature of the emulsion should not exceed 40° Centigrade, or about 100° Fahrenheit. When the emulsion on the plates has stiffened to a jelly, the plates should be dipped for a moment in alcohol, and then washed in a current of cold water. As the coating is very thin, the washing takes very little time, and the plates may then be dried. The plates will keep unchanged for an indefinite period, but, before using, they should be dipped for two minutes in a solution of 1 part nitrate of silver, and 1 part acetic acid, in 200 parts of distilled water, and again dried. This dipping greatly increases the sensitiveness, and the brilliancy of the image, but makes the plates liable to change, so that it is only applied just before use. The plate is exposed in the usual way, but for a long period, and is then developed with pyrogallic acid and ammonia. The proportions of the developer affect greatly the brilliancy of the image. Three stock solutions should be made, one containing one part pyrogallic acid to 100 parts water; the second containing 10 parts bromide of potassium to 100 parts water, and the third consisting of strong ammonia, of density 0.960 at 18° Centigrade. To make the developer, 10 parts of solution 1 must be taken, with 15 parts of solution 2, and 5 parts of the ammonia, and the whole mixed with 70 parts water. An ammoniacal solution of chloride of copper may be used for development, with good results, but the solution is unstable. After development, the plate is fixed by ten or fifteen seconds' immersion in a 5 per cent solution of cyanide of potassium. To obtain the best results, it is advisable to reduce the action of the blue rays of the image by placing, either in front of or behind the lens, a color-screen, consisting of two pieces of plate-glass, cemented at the edges, and containing between them a solution of primulin.

PORTALS.[1]— I.

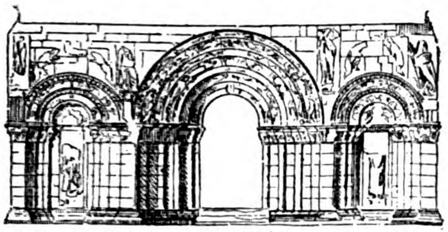


Fig 1. Church of Chadenac (Charente-Inférieure.)

THE French term *portail* (portal) is applied both to the main façade and to the important entrances of Catholic churches; but we shall confine ourselves in this sketch wholly to the latter use of the word.

It was really the Christian architecture of the Middle Ages that created the finished monumental type of church doors, with special dispositions, complete in themselves apart from the decorative motives around them, and deriving all their magnificence from their bays and embrasures. Down to the reign of Charlemagne, the entrances to religious edifices were scarcely distinguishable from those of civil monuments; they were generally square bays with mouldings, casings and sometimes with pediments. As they were often pierced beneath an arch forming a part of a portico or porch, the arch was gradually incorporated into the disposition of the doorway and at length came to be its chief feature; the casing and its pediment, flattened under the semicircle, became the lintel and the space between this and the arch formed the tympanum. As a survival of the pediment, the top of the lintel was, until the end of the twelfth century, often cut with its upper edge cut to form an obtuse angle [*en dos d'âne*] at the centre.

From the beginning, or rather the middle, of the eleventh century, there was a tendency to deepen the embrasure in order to form a genuine frame to the door. Thereafter, it often happened that when the wall was too thin to give the embrasure the desired amplitude the thickness was so increased as to make a mass of masonry in which the doorway was cut, as it were, in rock itself. In this way as many as four or five concentric covings were obtained, supported on the same number of columns or pilasters. With this increase in depth there was a corresponding increase in breadth, entailing sometimes the division of the bay by a central pier or trumeau, and thus relieving the lintel, in cases where it was not deemed expedient to replace the latter by two secondary arches.

Whether Burgundy was or was not under the dominating influence of Cluny, it seems to have taken the initiative in this development of the portal; and it was probably here that the trumeau originated, which, in its turn, became the point of departure for new decorative motives, at the close of the Romanesque era.

Nothing at any period has surpassed the variety, elegance, grace and wealth of conception and ornamentation displayed in Romanesque church portals. Every school exhausted its entire resources upon them; but there were few local types, so far as the general disposition was concerned. The poorest of all the schools was that of Auvergne; its doorways are of elegant and correct proportions obtained at the expense of impressiveness. In Poitou, Angoumois and Saintonge, the church entrances are sumptuously decorated, but they lose perceptibly in value because the ornamentation is carried over too much on what is around them, and because historic subjects are introduced that should be limited to the tympanum; the latter was even suppressed at that time (Fig. 1); this absence of the tympanum, not arising from the same causes there, was purely accidental in the other schools (Fig. 2). In Burgundy (Fig. 3) on the contrary, all embellishment was confined to the tympanum and the embrasure, the outer archivolt having a slight prominence; this prominence was more pronounced in the Provençal school. Here we have to count with Roman survivals, sharply indicated in the covings by decorative motives borrowed from ancient arches and entablatures, and in the jambs by the use of channelled pilasters, or of columns, channelled, twisted and intertwined or covered with divers patterns. In the Provençal school we sometimes find a rudimentary entablature, as in Roman times, between the columns and arches, and the colonnade is carried along on the flat of the wall without detracting at all from the importance of the embrasure. In Saint Trophime at Arles [See "Religious Architecture," Fig. 13, *American Architect* for July 26, 1890] and in the abbey-church at Saint Gilles [See "*Eglise*," Fig. 32] this disposition was taken advantage of in a marvellous fashion. The trumeau rarely occurs in Norman structures and the lintel is replaced by an arch, the convexity of which gives the tympanum a peculiar shape [See "*Eglise*," Fig. 40.]

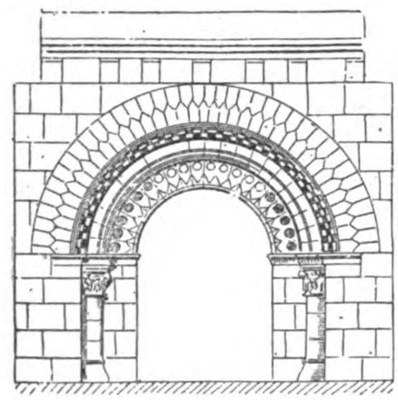


Fig. 2. Doorway at Sérignac (Lot-et-Garonne.)

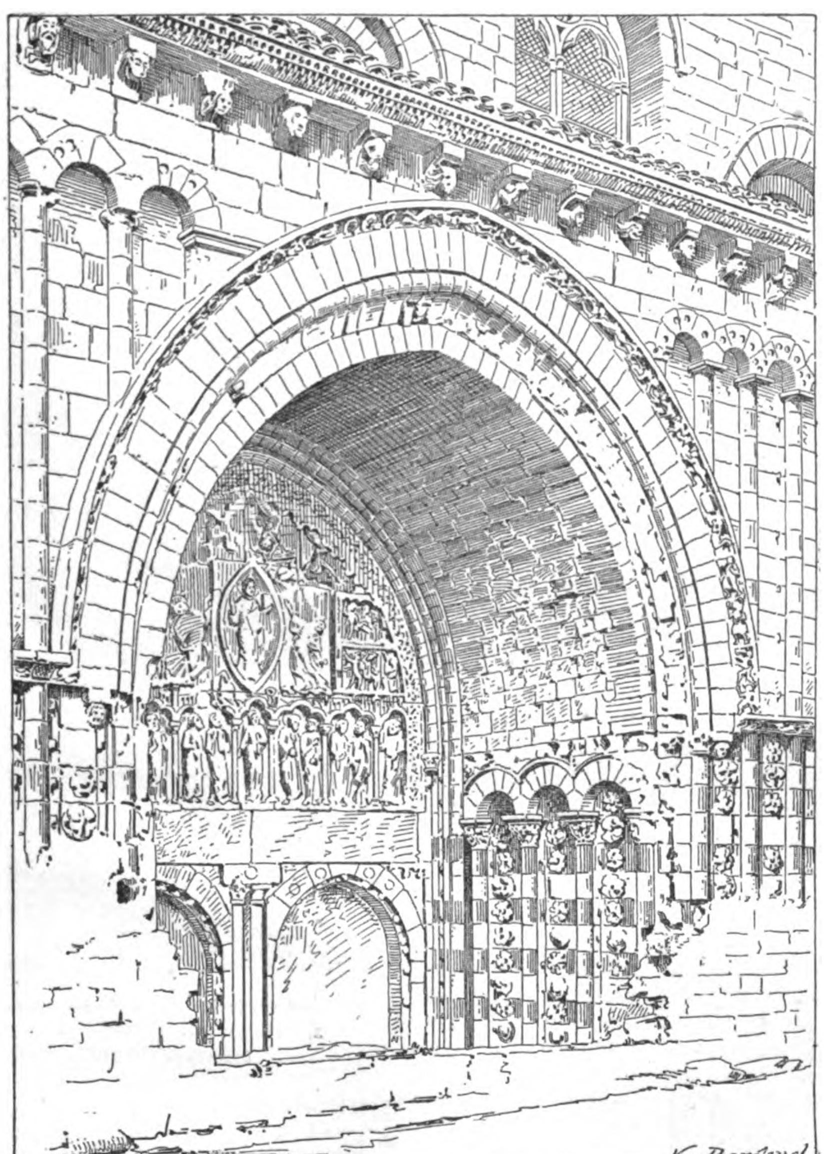


Fig. 4. North Door of the Cathedral of Cahors.

Limousin was the only province that created a type of portals distinctively its own; this has already been described under the heading "*Mixte* (*Ecole*)." See also the accompanying Figure 4.

The portal, which is necessarily the most conspicuous part of the church and in which everything is arranged for the eye,

[1] From the French of A. Saint-Paul and H. Nodet, in Planat's *Encyclopédie de l'Architecture et de la Construction.*

was the place especially selected by mediæval artists for depicting the historical or allegorical scenes that seemed best calculated to instruct the faithful or to produce the deepest impression upon their minds. The tympanum was admirably adapted

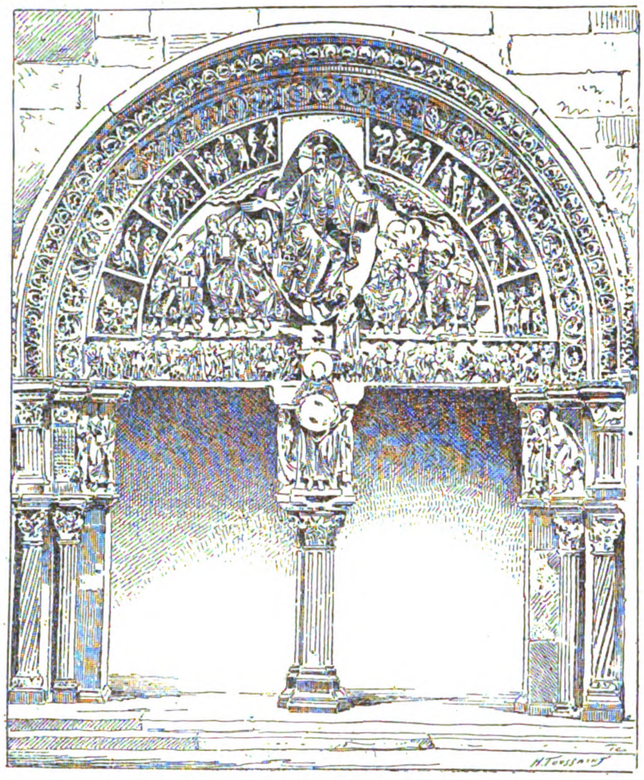


Fig. 3. Portal of the Church of Vézelay.

to the sculptor's needs; here he chose to portray Christ presiding at the "Last Judgment" or enthroned in the midst of the Apostles, or the four and twenty elders of the Apocalypse, or the celestial court. Often he was content with representing Christ and the Tetramorph.

From the second quarter of the twelfth century, there was a tendency in the different figures, whether connected with the central subject or not, to invade the covings and later, under the form of statues, the jambs themselves. The introduction of large statues into the portals seems to have been due to the use of trumeaux; possibly, however, it came about in quite another way; they may have originated in the effigies which, in Auvergne for example, sometimes accompany the jambs without penetrating them; it is nevertheless probable that the trumeau, early carved as a statue, demanded complementary works of the same kind on the sides.

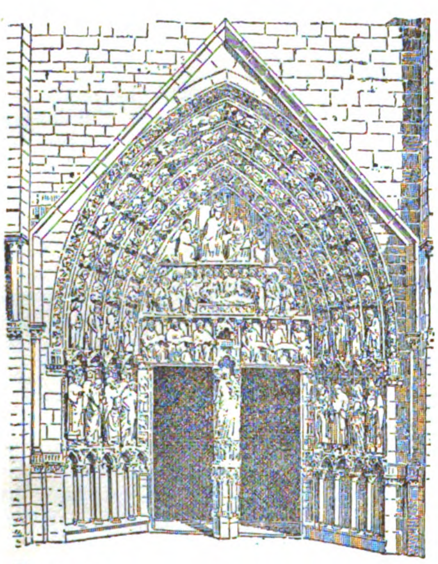


Fig. 5. Portal dedicated to the Virgin, at Notre-Dame, Paris.

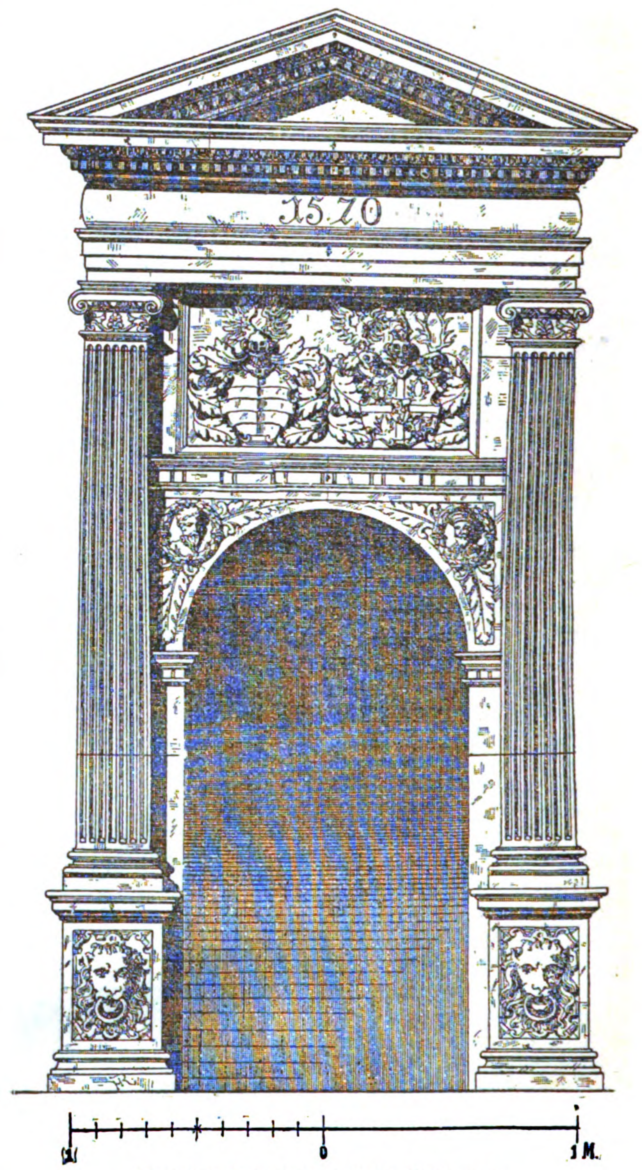
It is not absolutely certain that the complete Romanesque portal, with trumeau, statues and statuettes, preceded and paved the way for the primitive Gothic portal; it is not impossible, on the contrary, that the former borrowed largely from the latter. For the Romanesque portal was maintained during a century — according to the schools — in conjunction with the Gothic. We find the Gothic type constituted as early as 1146 or 1147, on the north transept of the church built at Saint Denis by Suger; but here the statuettes of the archivolts do not yet stand out from the masonry, as we shall see them doing shortly after at Notre Dame de Paris (Fig. 5) and elsewhere. In the Paris church the capital spreads out as a canopy over the heads of the large statues, and this disposition was maintained until toward the middle of the thirteenth century.

The broken arch, already adopted for this reason in a great number of Romanesque portals, furnished a more extended tympanum surface, which sculptors took advantage of and which often even seemed insufficient for their purposes; the space was then enlarged by pointing the arch as much as possible or by stilting it. Carving, on the other hand, had made advances: the details of the "Last Judgment" could be brought out more minutely, and for other subjects the surface could be divided into several pictures. An important addition was made on the extrados toward 1225; we refer to the gable, which gradually assumed its characteristic disposition.

(To be continued.)

MODERN ASYLUMS FOR THE INSANE.[1] — III.

INFIRMARY WARDS.



Doorway to East Staircase, Castle of Offenbach.

THE best general arrangement of an asylum has been found to be one that provides for a central administrative block, containing accommodations for the staff of officers and servants, as well as the kitchens, laundries, general bath-house, store-rooms, etc. The wards for the males and females should be placed respectively to the right and left of the central or administrative block, and the architect in arranging his plan must give due consideration to the desirability of securing a position adjacent to the workshops and laundries for the wards in which those working patients may be lodged, near the scene of their labors, while the non-working portion of this community may be located at a distance from the shops; these

[1] By George H. Bibby, F. R. I. B. A., F. R. Hist. S., and Ernest A. E. Woodrow, A. R. I. B. A. Continued from No. 913, page 198.

remarks refer with equal force to the male and female sides of the asylum and an arrangement on these lines may be seen in the plans produced to illustrate the second chapter of these papers. (See issue for June 24, 1893 of the *American Architect*, page 197).

As we are of the opinion that it would elucidate matters, to treat with detailed portions of the general scheme of an asylum before dealing with it as a whole, we propose proceeding with a description of the arrangements of the various blocks of buildings devoted to the different classifications of patients, who may be treated for relief or cure within the walls of the asylum; by adopting this course we deem it easier to grasp the ideas that must be formulated in order to create a complete scheme for a lunatic asylum. For the present our text must be "Infirmary Wards."

An infirmary ward will contain all kinds of patients, the bedridden, the aged and the young, those suffering from accidents that occur casually within the asylum, such as broken bones (by no means an uncommon incident in large asylums), and those under medical treatment for various ailments, all suffering concurrently from varied forms of insanity. It will be easily perceived, how such a portion of the building should be within easy access to the medical superintendent and his officers, whose attendance may be required at any hour, day or night.

The infirmary blocks should be placed, without doubt, so as to command a good southern aspect, and it may be well on both the male and female sides, to locate these buildings nearer than any others to the central administrative block, conveniently near the medical officers' and attendants' quarters; it should also be borne in mind that "recent cases" also should be placed in a position which is easy of access for the officers of the institution. It is a good principle to adopt that no ward should be designed for a less number of patients, than would, under ordinary circumstances, require the services of more than one attendant; an area of not less than seventy feet superficial should be provided per patient in the dormitories of the infirmary.

The "day-rooms," of which there should be at least one in each ward, should afford not less than forty feet of superficial area for each patient; in making this calculation, corridors which are of a less width than ten feet should not be reckoned, but when corridors are ten feet or more in width they may be looked upon as affording such a relief to the day-rooms, that a superficial area of twenty feet per patient may be deemed sufficient, provided that the corridors and the rooms together afford an area of not less than forty superficial feet per patient; mere passages of communication are not to be considered as corridors. The "day-rooms" should be so arranged as to afford ready access to the grounds, and it is desirable that those apportioned to the aged, sick, infirm and excited patients should be on the ground-floor level.

Bedrooms should be provided for two or more attendants to each ward, unmarried attendants' rooms not being less than of one hundred feet superficial area; such rooms should, wherever practicable, be placed between two dormitories, and have the doors of communication glazed. Where married men and their wives occupy the post of attendants, the rooms must be larger, but we shall have some remarks to make later upon the desirability of providing separate cottages for married attendants.

All infirmary wards should have a kitchen or "ward scullery" fitted with a cooking-stove for warming and preparing food for the invalids, without having to send to the main kitchens of the asylum for the purpose, which in even small asylums would entail a considerable journey and consequent serious loss of time.

Assuming that accommodation in an infirmary block is required for sixty patients, it would be wise to provide for say twelve of them in single sleeping apartments, each about one hundred superficial feet in area; two or three of these should be somewhat larger and fitted with fireplaces, for the benefit of cases suffering from pneumonia or any chest complaints. A padded room is also requisite, and attendants' rooms in proportion of one for every ten patients. There should also be four baths for each of such infirmary blocks, as the patients would in most cases be unable to make use of the general bath-house; in these matters, and the lavatory and water-closet accommodations, an asylum must be treated in a similar manner to an ordinary hospital, but always with special regard of affording sufficient opportunities of supervision, observation and control of the patients on the part of the attendants.

Although we have given twelve as the number of single rooms desirable for sixty patients in the infirmary ward, yet the proportion throughout the entire asylum need not exceed one-fourth of the entire number provided for in the institution. The English Commissioners in Lunacy require that single rooms should be chiefly in the wards appropriated to the excited and sick, and although sixty-three feet superficial is the least space allowable in the wards for chronic and other patients, yet the space for single rooms in the infirmary should be one-third greater. Many are of opinion that the infirmary wards (including the wards for recent cases) should provide for one-fourth of the whole number of patients.

To sum up: the infirmary ward must contain day-room, single rooms, associated dormitories, attendants' rooms, padded-room, bathroom (with movable bath), boot-room (with one or two lavatory basins), coal-cellar, dust-bin, soiled-linen closet, lavatory, urinals, water-closets, store-room, cleaner's cupboard for pails, brooms, etc., kitchen or ward scullery; it must, however, be borne in mind that it is not desirable to provide for each individual block for different classes of patients more than is requisite for the comfort and care of the patients and the necessities and convenience of the special attendants in charge, otherwise there is an unnecessary and continuing expenditure in maintenance and control. All matters that can be made common should be provided for in the central administrative building.

The English Commissioners in Lunacy require that the windows of the day-rooms and corridors should be large and not more than three feet six inches from the floor. In dormitories and single rooms as a general rule, they should be four feet from the floor with wooden sashes, double-hung and made to open easily, so as to allow a free circulation of air, but not so far as to expose the patients to danger; the walls below the sills of the windows in the dormitories may be splayed, but in the day-rooms and corridors they should be recessed to allow of a seat.

If not otherwise protected, the windows in all parts occupied by patients should be "stopped" so as to only permit of their being opened five inches top and bottom; the panes should be of moderate size, so as to be renewed at the least expense when broken. Strong solid shutters should be fitted and hung in the majority of the sleeping (single) rooms, and so constructed as not to admit of being forced open or afford opportunities for the patient committing suicide by hanging themselves therefrom; for that reason when the shutters are open they should fold back into recesses in the wall and be held there by a self-locking spring which would require the attendant's key to release them. In the day-rooms, bay-windows may be introduced with advantage.

The doors of the single rooms should open outwards and should also be so hung as to fall back close against the wall; doors, to the rooms occupied by excitable patients, should be specially strong; and those where epileptic cases are lodged should have an open panel, about four and a half inches wide, in the centre above the middle rail through which the attendant can observe the patient unseen by him.

In every block of buildings (for patients of all classes) there should be very ample conveniences for lavatories in which the inmates can perform their ablutions. In some instances the bath-rooms may be arranged so as to serve for two wards. The water-closets should be in proportion of one for every ten patients, and a separate one for ten attendants, it is a good arrangement to group them in an annex with a lobby of not less than five feet wide, with cross ventilation, separating the water-closets from the ward. The slop-room should contain a sink and space for brushes, and the store-rooms should be fitted up for the storage of clothing, bedding, crockery and other things in use in the wards. The boot-room or bonnet-room should always be placed quite near to the entrance leading to the grounds, that the patients may remove their dirty boots outside before entering the corridors or day-rooms.

A great authority upon asylum sanitary questions has stated that with regard to the position and arrangement of water-closets there must necessarily be a great difference in various asylums, for in some the patients can be trusted to a great extent, while in others they cannot. There is a class of patients known as the "dirty patients," and to provide against their distressing habits the architect must inquire into their peculiarities, unpleasant though the task may be. It has been known that some poor sufferers from mental disease will put their hands into the pan of a water-closet, to collect if possible, the soil or incrustation that may have accumulated there, and even, revolting as the idea is to the sane, try to eat it. Such sad cases must be met by the architect with special provision for their well being. Earth-closets also afford serious trouble with this class of the insane, as they are apt to smear everything with that which they can extract from the closet. In one case closets with ten feet drop and railings round the seats have been tried. It was found that a large consumption of water was requisite in order to cleanse this apparatus.

In illustration of the great care that must be exercised in designing closets we draw the attention to what occured some years ago at Wakefield Gaol in England, where the prisoners were treated on the separate and silent system. There was a serious outbreak of typhoid fever, and Sir Robert Rawlinson was instructed to inspect the building and report upon the case; after a very brief examination he found, on each side of one end of a dividing wall, a pan-closet, each closet being connected with the sewer by the same four-inch drain pipe running straight down the wall into the sewer, which was never cleansed or flushed. The prisoners found out that by lowering the trap or pan, and holding their heads down over the container, they could converse through the closets with one another; while doing so they were, of course, inhaling sewer-gas, and hence the outbreak of typhoid fever. We quote this instance to show, that if criminals in their senses require such close watching, the poor insane inmates of asylums must need most careful protection against the inclinations resulting from their distressing infirmities.

The staircases in all wards should be so arranged that the inmates may not necessarily have to pass through other wards. Access should also be easily obtained to the main corridors and airing-courts by each class of patients without having to pass through portions of the building not set apart for their particular use. There should always be two exits provided for each day-room and dormitory, one at either end.

Staircases which lead from floor to floor should be of ample dimensions, not less than six feet wide with handrails on both sides; they

should be constructed of fireproof materials and be easy for ascent or descent, no winders should be permitted, and the landings should be square on plan; means should be provided for preventing the patients throwing themselves over the balusters, and to this end, it is well to carry up the walls on both sides and the centre wall where necessary.

It is requisite to have all day-rooms and corridors thoroughly warmed by means of either open fireplaces or open-fire stoves: in large rooms two fireplaces should be provided; they are also desirable in the general dormitories, but additional means of warming will be found necessary in the corridors and large rooms, this subject, however, will be dealt with by us in a later article.

As a general rule, corridors or passages should not be wider than necessary to connect the several parts of the building, or the upper stories. Corridors, especially wide corridors, should be particularly avoided, as far as possible, but it has been found, however, of great advantage to have on the ground floor of the male and the female side of the building one good corridor to the south, with large bay-windows, to afford a promenade for the inmates to take exercise in wet weather: a seat in the bay-window is always appreciated by the patients.

With regard to the general height of each story (of which it is well not to have more than two), twelve feet should be the minimum, and there is no necessity to exceed this. The upper floor of an infirmary ward should be utilized for the quieter patients, and it is most advisable in England that a southern aspect should be obtained for some of the dormitories, in order that those who cannot leave their sleeping-apartments may have the benefit of the brightest outlook and each ray of the sun. The dormitories should have windows on both sides, for the sake of cross ventilation, and the cubical contents of those in the infirmary should be greater than for those in any other portion of the asylum for very obvious reasons.

In the foregoing we have endeavored to point out that each ward should be absolutely self-contained and separate, with a full complement of attendants' rooms and conveniences of all kinds; in arranging the attendants' rooms it need hardly be insisted upon that due regard should be observed as to economizing labor and giving every assistance to facilitate supervision of as much of the ward as possible.

Figure 1 shows a ground-plan of an infirmary ward which we have chosen to illustrate certain points which should be avoided. It is undesirable to have the dormitories arranged with more than two rows of beds, and there should be at least one exit at each end of these apartments. The plan is so arranged that none of the single rooms and one of the associated dormitories would be without the benefit of the direct rays of the sun during the greater portion of the day. Two of the attendants' rooms are badly placed, as they do not command a view of two apartments: they are not planned with due regard to economy of labor in supervision.

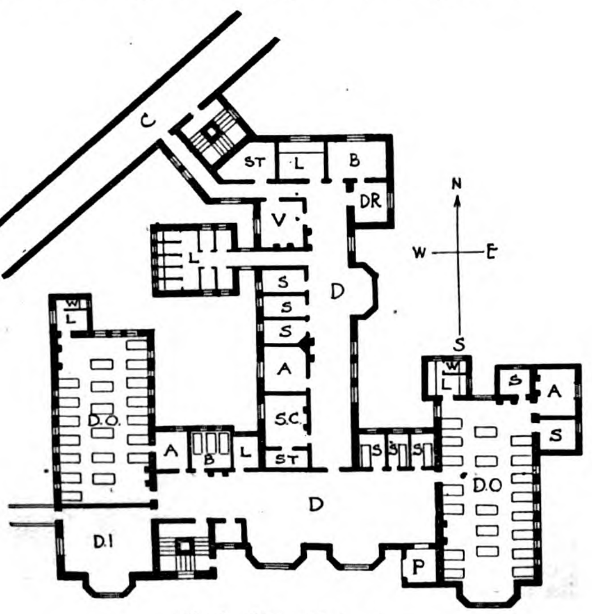


Fig. 1. Sick and Infirm A.

A. Attendant.
B. Bath-room.
C. Corridor.
D. Day-room.
D I. Dining-room.
D O. Dormitory.
D R. Dressing-room.
L. Lavatory.
P. Porch.
S. Single Room.
S C. Scullery.
S T. Stores.
V. Visitors' Room.

In Figure 2 we illustrate what has been considered a good workable plan for the infirmary block; the rooms are spacious but without waste, they are arranged so that the officers of the asylum can pass through the whole of the rooms without having to retrace their steps, a most important consideration, when it is borne in mind how much ground has to be covered in a day by the officials. There are two exits to each associated dormitory and day-room, and the beds are placed in two rows only; the attendants' rooms are located with a view of facilitating superintendence and supervision of the exits from the wards, the water-closets are in an isolated annex. With regard to the aspect it will be noticed that one of the dormitories has windows facing west, south and east, in this the bedridden and helpless patients would be placed; of the single rooms, two look towards the west, and if it were not for sacrificing light to the day-room and other

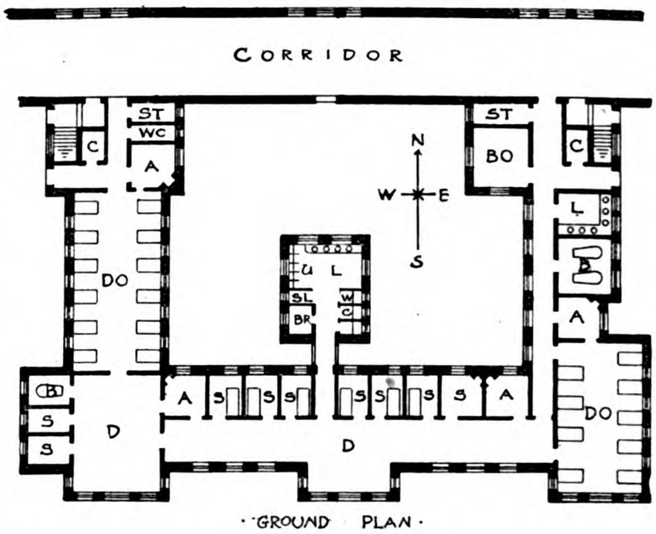


Fig. 2. Sick and Infirm B.

A. Attendant.
B. Bath-room.
B O. Boot-room.
B R. Brushes.
C. Coal.
D. Day-room.
D O. Dormitory.
L. Lavatory.
S. Single Room.
S T. Stores.
U. Urinal.

portions of the ward, it would be better to give a more cheerful aspect for the other single rooms.

Notwithstanding the great progress that has of late years taken place in the perfection of the arrangements for the care of the insane, and the revolution that has come about in opinions and practice of the treatment of mental diseases, there are many people, who, if invited to visit a lunatic asylum, would regard the proposal in somewhat a kindred spirit to that they would entertain in reference to a wild-beast show: they would certainly expect to see something very different from their daily experience of humanity, but would come away not a little surprised at the result of their visit, and wonder where the insane patients were. It is related of Mr. Burke, the great philosopher, orator and statesman, that after going through the wards of a large lunatic asylum, he turned to the gentleman who had conducted him, and remarked that he had not seen one person whom he considered mad. Thereupon his conductor called to him, one of the patients, who had particularly interested Mr. Burke by his ingenious political theories, and by a question touched upon the subject of the poor man's delusions, when the patient began immediately to talk of the porcupine-quills which he imagined to grow from the skin after eating each meal and became so incoherent that Mr. Burke was convinced that madmen were not all like the picture Hogarth drew of them.

We might, to illustrate the great difference in affairs between the time of this great painter, and the present age, here reproduce his famous picture "The Rake in a Mad House." There we should notice a number of "single rooms" with a row of small rooms opening into what appears to be not only a "day-room" for the patients, but a promenade and "show" for the curious sightseer who, it is related, paid the "keeper" for this doubtful privilege. There appears to have been no attempt at classification of the patients, as now practised; the beds are of straw and chains the order of the day, and one need not draw on the imagination to depict the utter foulness of the sanitary arrangements (or lack of arrangements). The prospects in such a room of a patient recovering mental power, or of maintaining a healthful state of body must have been extremely limited. Even at such a recent date as 1831 there were 295 patients admitted to Hanwell Asylum; 210 died that year and on the 31st of December there were 254 still in this asylum, whose record of recoveries for the same year was only 69.

In the same asylum 423 patients were admitted in 1870. The deaths were 182, while the average number accommodated that year was 1776. In 1891 the numbers admitted increased to 481,—177 died during the year. The average number in residence was no less than 1892 patients, of whom 169 recovered and 102 were relieved. In considering these figures it must not be forgotten that many cases are now treated as insane which in years gone by seldom obtained admission to a public asylum. From these figures it will be seen that the structural improvements in the building and the varied treatment of the patients since the year 1831 have not been without good effect.

In the infirmary wards, it is self-evident what are the advantages of a sufficient cubical contents which should always exceed what is provided for rooms occupied by healthier patients. There should be, at least, two cheerful and comfortable day-rooms in each infirmary ward, one of which should be especially arranged as a dining-room, as it is better for the sick or convalescent not to mix with the other patients in the common dining-room.

For the insane of "dirty" habits a certain proportion of beds of chaff or cut straw should be in use in each division of the asylum, but these should be strictly limited in number as they tend to encourage the faulty habits and to perpetuate and not to cure the disease. It has been recommended for feeble patients that low padded bedsteads should be used for feeble patients who are compelled to sleep near the floor. These should be made capable of being locked in position and easily removable for cleansing the floor. The whole subject of the treatment of the unclean class is one of the greatest importance, and one in which the experience of the architect can facilitate the management of an asylum in the due execution of the unpleasant duties which devolve upon the attendants of this section of the inmates.

Attached to the infirmary is usually a ward for those newly admitted, with facilities in the arrangements for the study of the respective cases by the medical officers. The bath-room in this department should be fitted with a bath so arranged that the attendant can walk all round, for the convenience of bathing and controlling refractory or weak patients. With regard to the infirmary wards, it is well to let each floor be self-contained, and not be partly in use by occupants of either floor.

A number of infirm patients in every asylum are bedridden and helpless, and their care is always an anxious affair. They suffer from various kinds of brain disease, frequently suicidal in tendency. Pulmonary consumption is very prevalent in this ward, and during the recent waves of influenza both patients and attendants have suffered severely. It must not be forgotten that mechanical restraint is needed in some cases while others demand seclusion and constant watching.

All infectious cases should be isolated in a detached building, which should be erected upon the lines of a fever hospital, with special precautions in view of the mental derangement of the sufferers. This, however, demands an article to itself. We first purpose proceeding with the accommodation necessary for chronic, epileptic, acute and working patients and the administrative arrangements.

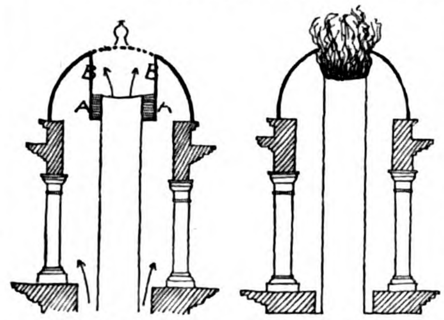
[To be continued.]

THE BURNING OF THE COLD-STORAGE WAREHOUSE ON THE FAIR GROUNDS. — THE EXHIBITS OF ARCHITECTURAL DRAWINGS.

IT is with regret that we have to begin this week's letter with an account of the disaster at the World's Fair, so harrowing and distressing in its consequences. This catastrophe, as is known, was the burning of the Cold-storage Warehouse, in whose destruction many people lost their lives. The list of mortality lies chiefly among the men in the fire-department, though at present writing it is not known how many of the employés may have failed to escape from the buildings. The Cold-storage Warehouse has been described before in these letters. It was about a hundred and fifty by two hundred feet in area, and had in the centre a tower rising two hundred feet above the ground. The north end of the building was used for cold-storage, while at the south were the ice-freezing tanks and the offices of the company. The building stood in the southwest part of the grounds, on Stony Island Avenue and Sixty-fourth Street, or near it. It was constructed of wood and iron covered over with staff. The Corliss engine operating all the machinery of the place was run by a battery of five boilers. Director Davis is reported as saying concerning the structure: "It was not one of the regular Exposition buildings. We have taken almost every possible measure of precaution against fire in the main buildings. I wish it understood, too, by the public that visitors may see all the exhibits in the buildings without going more than twenty-four feet high. That is the height of the galleries. Some of them are lower. We invite people to see exhibits, and all these may be viewed without risk from fire. If people desire to patronize roof concessions, that it is a matter for them to determine."

Wherever the blame may lie, this much is certain, that the assistant fire-marshal of the grounds, who lost his life in the flames, had condemned the place, as well as Chief Sweenie of the Chicago Fire-department, and at the time of the burning but a trifling insurance was being carried, as underwriters were unwilling to risk anything on the place.

The two-hundred-foot tower, which rose as a picturesque object in the centre of the building, was the death-trap of the brave firemen who were called to the scene when the fire broke out at its summit. This tower was, in reality, the chimney of the establishment. It was not constructed of brick, but simply was an iron smoke-stack encased in wood. This, according to the plans, was not so positive a fire-trap as it sounds. The stack stood in the centre of the high tower of the building, on a brick foundation ten feet in height. It was seven feet in diameter at the bottom and five feet at the top, and was lined with fire-brick about a third of the way up. The stack itself was of strong boiler-iron, and standing, as it did, in the centre of the shaft, which was twelve feet in diameter, it had ample air-space around it, this space being used as a ventilating-shaft from the boiler-rooms beneath. The wooden shaft terminated in a colonnade, while the stack passed through this and terminated just under the dome of the roof. Here, according to the plans, an iron thimble was to have been placed over the stack, six inches larger than the flue, the space between being filled-in with asbestos. The thimble was never put in place. The tower was lined with matched pine flooring, so when the woodwork at the top of the stack caught on fire the brands simply fell inside to the bottom of the tower, the strong upward current of air quickly fanned them into a blaze, and the building was doomed before the men working on the top of the tower realized the danger.



The Chimney as it was designed. The Chimney as it was used.
A. Asbestos Packing. B. Thimble.

The coroner's jury is at present at work on the case, and the papers are full of suggestions for a thorough investigation. First one, then another, is criticised, but it looks now as if the chief blame lies with the owners of the establishment.

One of the chief objects of interest at the Fair to the full-fledged architect, as well as to the architectural draughtsman, are the series of drawings displayed by different nations in the Fine Arts Building. To the draughtsman whose style has not yet been formed, these collections are of the utmost value, and, indeed, to any one it cannot help but be interesting to see how, through the entire work of a nation, certain characteristics prevail. It is to be regretted that not more enthusiasm has been evinced by our own architects to make this display more worthy of them and the splendid work which they have accomplished within the last few years. Russia has no work in this line, Italy's architects are conspicuous by their absence, and Austria is only represented by a small number of drawings. The display from France is very meagre as far as present-day work is concerned, their exhibit consisting chiefly of casts from the Trocadéro. England has not evinced greater enthusiasm than others in this display, while Japan has no plans, only a few elaborate models. Germany outdoes us all in conscientiousness in this exhibit, as she does in many others. She has models, elevations, perspectives, plans, all treated in various methods. America's exhibit is characterized by the greatest artistic skill in the handling of the designs. The three distinct ways in which our architects treat their drawings are here very clearly shown. First, the almost impressionist style, which is charming for office sketches, but hardly accurate enough for actual architectural drawings; second, the careful line-for-line draughting, which admits and permits but little artistic effect; and, third, a happy combination of the two extremes, which results in a most delightful style, accurate enough to convey to the client the entire finished effect of the work, yet a treatment into which some artistic element can be introduced. In the entire exhibit, these special studies of American architects stand out as a class. A fourth style might almost be said to find itself among these works, and that is such drawing as has been influenced indirectly by the French school training, but directly emanates from such schools as the Massachusetts Institute of Technology, Columbia College, etc.

The French work is especially marked by this style. Everything is technical with them, and, though much of it may be well done, is in itself extremely uninteresting. The French complain that to their architectural exhibits the public turns blind eyes, but how anything else could be expected it would be hard to imagine with what is made so extremely technical and uninteresting to the general public. When the question of working-plans is not involved, it seems wiser to produce something that would be of more interest to the professional eye, especially when that eye in the elevations and perspectives is the one to be appealed to. As soon as architecture becomes better appreciated and better understood, just so soon will better times dawn for the members of the profession, and it seems a pity to repulse public interest when it could quite as well be attracted. It is really surprising to see how many people do visit the galleries where the architectural display is chiefly located. At present, public culture in this direction is weak indeed. Before a very large elevation of the Ames Building, two distinct parties remarked within the same five minutes: "Oh, there's the Owens Building," and "There's the Masonic Temple." Both buildings are found in our city, and if anything could be more totally unlike than the two it would be hard to find. Plainly as this bespeaks a lack of intelligent observation, still the growing public interest in architectural subjects is very noticeable. All classes, those who know nothing and those who know a little, talk of the Fair buildings with more enthusiasm than they show for any of the actual exhibits, and there is evidently a tendency among those heretofore

indifferent to the subject to at last come to some realizing sense of the beautiful possibilities of architecture.

Germany's manner of working is curious. Always her drawings are made with scientific accuracy, but there is often combined with this a certain artistic handling of finish and surrounding which lends attractiveness to the whole. Of course, this is a difficult thing to do, and only with the most superior draughtsmanship is satisfactory. With those of less ability the result is devoid of freedom, and becomes neither technical nor artistic. It is a curious fact to notice that the examples of German architectural work are all pretentious or would-be pretentious designs of public or semi-public buildings, with almost no examples of domestic architecture.

The Austrian work, like the Austrian character, is a curious combination of the French and German.

England's work, considering the size of the exhibit, is really the least satisfactory, as a whole, of any found at the Fair. Though there are certain splendid examples of architectural drawing in this department, the general style is neither characterized by clearness, strength nor vigor, but looks now like the result of a hopeless plodding in a well-worn rut.

The United States exhibit, small as it is when compared with what it should be, contains some good specimens of work treated in water-color, pen-and-ink, India-ink and sepia washes, pencil and charcoal designs, and even some in oils. Of these last, the only ones are the preliminary sketches for the figures to adorn the ceiling of the ball-room of the Hotel Waldorf. Though naturally very sketchy, these are really charming. Not far from these colored figures are some clever little travelling-sketches in pencil by Joseph M. Lawlor, which seem almost too good to be actual travelling-work. In the same corner of the gallery Adler & Sullivan have a very good drawing of their Union Trust Building, while very near this, Bertram Goodhue, of the firm of Cram, Wentworth & Goodhue, has three sepia-ink drawings, which are both strong and refined in treatment.

The perspective of the New York State Building is a good deal of a shock, coming, as it does, from the office of men of such good standing. The drawing of the building itself is treated with but little refinement, while the blues and greens of the muddy, careless washes of the background are simply atrocious. Better the purely technical treatment than such work as this. An equally striking "State-building" drawing is that from the "glorious State of California." It is rendered entirely in opaque color, and is huge in proportion. From the gallery, where one would expect it to be fine, it is extremely poor; but get across into the gallery at the opposite side of the building, and it comes out strong and clear. The method of treatment is not advisable to adopt in all places, for there are States too small to be able to give such drawings the necessary distance.

Two houses, which bear the name of Rossiter & Wright, executed on gray charcoal-paper, on which have been laid thin washes of water-color and Chinese white, are especially good in treatment, while somewhat similar in style and equally good in rendering is a study by Walter Kimball on light-colored water-color paper.

One example of good honest treatment where nothing architectural is slighted and a certain amount of artistic handling is introduced is a water-color of a house by Little & O'Connor which bears the number 3,272 in the catalogue. Of the works belonging to the class, where neither technical excellence is sacrificed to artistic effect, nor vice-versa, a frame containing some office sketches of Peabody & Stearns's stands out as a shining example. They are really charming. In this class, another excellent example is the perspective drawing for the Hotel Waldorf. It is to be regretted that at the time of writing this letter the catalogue of the United States architectural department, as well as most for the other exhibits of this kind, is either entirely wanting, or most inadequate. For the superb Trocadéro collection the catalogue is ready, but no numbers are yet on the casts, and what might be a real treat results in only a confused searching among the out-of-way corners of one's memory for certain pictures of this Romanesque portal or that bit of frieze or capital.

Cope & Stewartson are represented by some very clever work, two designs for the Pennsylvania Insurance Company's building being unusually attractive.

Number 3,248 — not found in the catalogue, however, as the numbers only reach the twenty-nine hundreds in the United States portion — is an excellent little architectural sketch in color of the Arch of Titus, while there is charming pen-and-ink work by such well-known men as Gregg, Pennel and Harry Fenn all qualified to give high inspiration.

In our whole collection no plans or working-drawings are given, which seems rather a pity certainly, as owing to our own peculiar methods of construction a few of them would certainly have proved most interesting not only to our own students, but more especially to foreigners.

As said above, Germany, in the matter of enthusiasm and conscientiousness, leads in this exhibit all the other nations here represented. Taking the display as a whole the subjects are certainly not interesting and in the specimens of the buildings given there is a grievous monotony of style, the architecture being chiefly Classic or Mediæval German. The drawings generally are of large public or semi-public buildings, the perspectives for which are usually in black and white. Some water-colors are found here that are almost amusing in handling. The buildings are executed with the greatest care and precision, but nature in the background is indulged in to the largest extent. One curious specimen of a group of buildings for a sanitarium or bath-house, comprises in its background fully forty miles of excellently painted nature in the shape of rolling uplands, surrounding the very diminutive group of buildings.

Skjold Neckelman's University of Strasburg is more worthy of study than many of its companions in the immediate vicinity. Noticeable for excellence of execution is the business house of the Tucherer Brewery at Berlin, of the Opera-house at Frankfort-on-the-Main, a portfolio of miscellaneous drawings of Huber Neustadt, and a most finished piece of work of the German book-binder's house at Leipzig. The drawings for the Cathedral of Strasburg are here displayed, as well as the fine large crayon drawings of Bruno Schmitz, a *projet* for a memorial to Emperor William and some elaborate fountains — Bruno Schmitz, as may not at first be remembered, was the designer of the soldiers' monument at Indianapolis. There are also some fine drawings for the restoration of the Cathedral at Metz, and excellent pen-and-inks of the Cathedral at Altenstein by Professor Neumeister. Nearly every drawing has its place. Their pen-and-ink work as a rule is much less free and artistic than our own, and a different standard of excellence must be held up before their architectural draughtsmen than is given to ours.

There is here in this department a very excellent collection of photographs of a high grade of excellence, and here let it be stated that great as is the loss, no really first-class artistic work has so far been produced by the firm which has the monopoly of the photographs at the World's Fair. It is very much to be regretted that something really beautiful should not be caught of all this transient splendor. The time and place are not at all carefully chosen, so that there is little of the charm of light and shadow which means everything in a photograph. Neither is the grade of the photographs themselves far removed from the commonplace. Some good work might be obtained from amateurs if it were not generally the feeling that it is very difficult to obtain permission to take any camera into the grounds. Two dollars buys the right to photograph within the Fair limits for one day and a dark-room not very far from one of the entrances is furnished through the courtesy of one of the exhibitors of photographers' materials.

But to return to the German exhibit. One interesting feature is the models of which there are several excellent ones. The Imperial-Parliament House at Berlin in plaster is the largest and most noticeable. Near to it is the Gnaden-Kirche in Berlin, reproduced in wood, care being given to the Romanesque details, and the reproduction of stained-glass. The Imperial Patent Office Building, the Imperial Insurance Office Building and the Emperor William's Memorial Chapel are each represented by excellent models.

Our own nation has two models curiously chosen from all our architectural wealth, these being the Manhattan Life Insurance Building and the Vanderbilt house.

The only architectural exhibit which Japan makes is several very elaborate and beautifully executed models. But as they are not catalogued, and as the average student's knowledge of the history of Japanese architecture is somewhat slight, much interest is lost in this excellent work. The Japanese make an interesting showing in some models of their landscape gardening in Horticultural Hall, and these models with some French drawings in the northern gallery of the same buildings seem to constitute the exhibit in this especial department of landscape gardening.

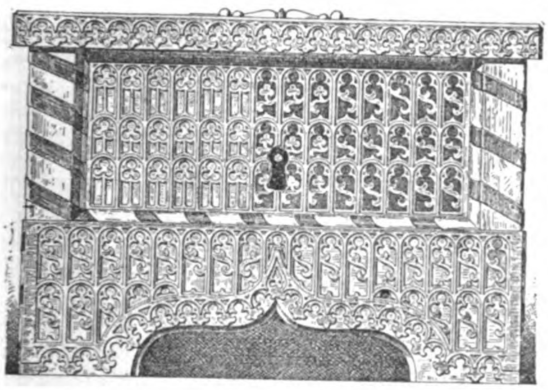
Austria's architectural exhibit is very meagre. She has a few water-colors of old buildings and several pen-and-ink drawings of actual present-day work. It would be hard to judge by these few specimens of the national characteristics, but certainly those shown display the careful school-training of the French, combined with the attempted freedom of treatment in background, etc., of the Germans. One curious set of drawings, quite apart by themselves, of some combination bath and concert-hall, are especially noticeable, inasmuch as their author has seen fit to patent them. After simply inspecting them, without the aid of any catalogue information, they seem no more worthy of being patented than any other set of drawings. Possibly towards the close of the exposition, when some of those things are catalogued, some light may be thrown on much which is at present hard to inspect intelligently.

As mentioned before, judged from our standard, England's exhibit is not as satisfactory as that of some other countries. Thomas Cutler's drawing of the Renaissance gallery at Avery Hill is charming while the proposed English church at Berne by Reginald Blomfield is almost as fine, so far as technical excellence is concerned, as anything in the whole collection. The work numbered 1009 in the catalogue from the office of Aston Webb and E. Ingress Bell, the completion of the South Kensington Museum, is an especially fine pen-and-ink, while Ernest George's exterior of Hall Shiplake on Thames, Basil Champney's "Moxley," R. W. Edis's Constitutional Club and Convalescent's Home are all worthy especial inspection, either from the well-known reputation of the men from whose offices they came or because of their own worth. A number of interior-decoration schemes are shown in this department, indicating that their architects give more thought to such finished work than ours do.

The French architectural exhibition is disappointing so far as the actual drawings are concerned. Aside from the fact that everything is extremely technical, the exhibit is in itself a poor one. Almost no drawings of recent work are given, but the display seems rich in restorations and various School *projets*. There are six or eight large

and fine drawings of the Restoration of the Château d'Écouen, but strange to say these original drawings are not as satisfactory as the reproductions published in the *American Architect.* Another Restoration similar in character is that of the Château de Tonquerer. One of the drawings for the School *projet* whose subject gave rise to so much merriment, an American sixteen-story building whose conditions were apparently that it should be "without form and void," is here as a sort of monstrosity. One small but pleasing feature in the drawing is a noble red-man in the foreground, nearly naked except for a few eagle feathers and similar light ornamentation. Some of the most interesting sketches are those of interior decoration, under which head would naturally come the sketch for the proscenium-arch the Salle de fête at the Trocadéro. The rest of the French exhibit of which it is indeed the chief part is the beautiful collection of casts from the Trocadéro, and which after the close of the Fair are to become the property of the architectural department of the Art Institute.

THE USE OF CONCRETE IN RAILWAY STRUCTURES.



Chest from Schloss Tratzberg. From Paukert's "*Zimmergotik.*"

CONCRETE as a material for engineering works has, until within comparatively recent years, been chiefly confined to harbor works; but lately it has been used in the construction of railway works, both at home and abroad. The advantage of employing this material is apparent in districts where the absence of good building stone or clay for the manufacture of bricks makes the cost of masonry or brick structures very great. One of the early applications of concrete for railway works was in connection with the last section of the Callander and Oban line, from Dalmally to Oban, in the west of Scotland. In this case the material was largely used in the form of rubble concrete for bridges, arches, culverts, retaining-walls, platform-walls, turn-table and engine pits. Since the completion of that railway, Mr. John Strain, the engineer, has carried out the same methods of construction on a number of lines in Scotland and also in Spain.

Rubble concrete consists of large stones embedded in a matrix of Portland cement concrete. The Portland cement used in these works was very carefully specified and tested to secure its being of the very best quality. In every case it was required to be stored at the works at least one month before being used, being placed under cover in perfectly dry sheds erected for the purpose. During the fortnight prior to its use it had to be spread out on a wooden floor raised two feet above the ground and turned over every alternate day during the fortnight, or until it was sufficiently cooled and fit for use. The cement had to satisfy the following conditions: The residue on a sieve of 2,500 meshes per square inch was not to exceed 20 per cent; weight per cubic foot to be not less than 90 pounds; test bricks of neat cement, and of cross section 1½ inch square, to stand a tensile strain of 790 pounds when seven days old, during the last six of which they were immersed in water. After the cement was sufficiently turned it was refilled into bags, the contents of each bag bearing a direct ratio to the size of the gauge-boxes used for the ballast. The sand used was always of coarse sharp quality and perfectly clean, being washed in every case where it was necessary to do so. The usual mixture for the concrete on these works was as follows: One part by measure of cement to five parts by measure of clean ballast. The ballast consisted of clean broken stones or slag and coarse-grained sand — the stones or slag were angular and of hard quality, broken to pass through a screen two inches wide in the meshes — the proportion of sand to the stones being determined by experiment from time to time. The whole materials, after being carefully measured, were thoroughly mixed together dry by turning over at least four times, and then further mixed by turning at least four times while a proper quantity of water was added through a rose. The mixing was done on a timber platform in a systematic manner by four men standing in a row, turning over the material by shovels from one to the other.

The method of employing the materials in the construction of what is termed rubble concrete was as follows: A bed of concrete, at least six inches thick, was put in before each course of stones, and on this layer of concrete, rubble stones were laid, care being taken that no two stones were nearer one another than three inches, nor nearer the face boarding of any exposed surface than three inches. The stones were firmly bedded down to make a solid bed, and afterwards carefully rammed and probed all round with a trowel to leave no interstices. All stones were placed irregularly with their diagonals at right angles to the exposed surfaces. Over each layer of rubble stones a further layer of concrete was placed and levelled off at a height of six inches above the top of the stones, and on this again a further course of rubble stones was placed and beaten down as before. All the faces were carefully formed against close horizontal boarding made into frames or boxes the shape of the work, and the concrete against these boards was carefully worked with trowels so as to leave the face quite smooth without any rendering or dressing. At exposed corners wood was placed to form chamfers. This rubble concrete has been largely used for ordinary abutments and wing walls of girder bridges of different spans. It has been extensively used for the intermediate piers of long viaducts and also for arches.

The best examples of its application to piers are to be found in the viaducts over the principal valleys and rivers crossed by the Tharsis and Calañas Railway in Spain. These viaducts were constructed in spans varying from 40 feet to 45 feet, with piers which vary in height up to 80 feet. All the piers were made of standard dimensions at the top — 4 metres by 15 metres — and with the same batter, 1 to 30, to enable the moulds or frames of one pier to be used for all. Piers exceeding 10 metres were at that distance from the top battered out an additional half-metre at each side in a height of half a metre, below which the batter of 1 in 30 was continued. The frames or moulds were simply large boxes without top or bottom. The four sides could easily be taken apart and put together. The depth of the boxes was uniform, and they were numbered consecutively from top downwards. Thus the engineer in charge of the works, knowing the height of his pier, could determine the measurements at base, and knew which size of box to use as a mould. As each box was filled the next one smaller in size was placed in position by a steam derrick crane, and thus the construction of the pier was accomplished. The following Table gives some of the dimensions of the bridges and the time taken in building:

CONCRETE PIERS FOR BRIDGES ON THE THARSIS AND CALANAS RAILWAY.

Name.	Length.	Height of Piers.	Number of Spans.	Quantity of Building.	Time taken to Build.
	yards.	feet.		cubic yards.	weeks.
Tamujoso River	145	28	12	1,737	14½
Oraque	141	31	11	1,590	15
Cascabelero	160	30 to 80	10	2,680	21
No. 16 (Valley)	98	28 " 50	7	1,046	16½
Tiesa	55	16 " 23	8	420	4

It is quite evident from these figures that the question of time is an important element in this form of construction. The construction of some of these bridges in ordinary masonry would probably have taken nearly as many months as the number of weeks occupied. The system adopted also enabled the work to be carried out largely by unskilled labor, with great rapidity and economy. The rock available for rubble stones in these piers was not of such a class as to give great blocks, consequently the proportion of pure concrete to the total mass of rubble concrete was greater than would have been the case had larger blocks been got. The average proportion of pure concrete in the piers was 69.7 per cent, and in one case where the stones were smaller than usual the percentage was as high as 76.5 per cent. In other work the proportion has been as low as about 40 per cent in rubble concrete faced with squared rubble, and about 55 per cent in rubble concrete faced with fine concrete. The average quantities of the various materials required for one cubic yard of building of the average proportions was as follows:

.304 cubic yard of rubble stone (measured as solid).
.684 " " " broken stones (measured in heap after breaking) representing about
.342 cubic yard of solid stone.
.358 " " " sand.
.178 " " " cement (3.9 cwt.)

On the Lanarkshire and Ayrshire Railway this method of construction was very extensively employed. The heaviest bridges in which it was adopted were the bridge carrying the Ardrossan line over the Glasgow and South-Western Railway, near Stevenston, the bridge carrying the Irvine line over the River Garnock, and the bridge carrying the Kilbirnie line over the Glasgow and South-Western Railway at Glengarnock. The first-named is built on a very heavy skew, 28°, and consists of two spans of 34 feet and 107 feet respectively (measured on the angle). The quantity of rubble concrete used was 1,650 cubic yards. It is a through bridge for a double line of railway, the floor consisting of cross-girders and troughing carried by two massive lattice girders. The second-named bridge, that over the River Garnock, consists of two central spans of 51 feet, and two side spans of 26 feet 6 inches, and is built on the square. The pier in the middle of the river was built within a coffer-dam and carried down to a depth of about 10 feet below the river bottom. The quantity of rubble concrete used was 1,400 cubic yards. The superstructure consists of plate-girders, and the bridge is decked with buckle-plates covered with a layer of about four inches of concrete. The ballasting is carried through, but on the bridge it consists of ashes, instead of the broken slag used generally on the whole line.

In the case of the third branch named — that carrying the Kilbirnie branch over the Glasgow and South-Western Railway at Glangarnock — the two abutments were built entirely of rubble concrete, of which about 2,300 cubic yards were used. The superstructure consists of cross-girders and buckle-plates carried on the top booms of two heavy lattice-girders.

In building these bridges the manipulation of the materials was done in steam concrete-mixers, which enabled a rate of building of 25 to 40 cubic yards per day to be attained. The rubble concrete was built within frames of horizontal boarding carried by vertical framing. For the bridges on the Ardrossan and Kilbirnie branches, the materials were the same as described in the case of the Tharsis and Calañas line; but on the Irvine line cement of a finer quality than that already described was used, leaving a residue not exceeding 10 per cent by weight upon a sieve having 5,800 meshes per square inch, and having a tensile strength of not less than 790 pounds upon an area of 2¼ square inches. After the concrete had been well mixed, it was tipped inside the boarding, levelled and well worked at the face. Then large irregular-sized stones up to two tons in weight (as they came from the quarry) were set so as to be three inches from the boarding and from one another, and were then firmly beaten down with malls to make a solid bed. All the spaces round the stones of this course were then packed solid with concrete, which was well worked as before. This course of stone was followed by another course of concrete, six inches thick, followed by another course of stone, and so on. Without counting the men engaged in breaking stones close by, the following were the numbers employed per crane; One crane-man and boy, one mason and ten laborers. In addition to these, about a quarter of the time of a joiner and his laborer was required daily to raise the boarding by a few feet at a time, so as not to cause unnecessary lifting of the stones. For ordinary bridges of about 400 cubic yards, the daily rate of progress was about 12 to 14 yards, whereas for larger bridges the rate was from 20 to 25 cubic yards daily. To maintain the same rate of progress in a rubble bridge of similar size would require about twice as many men, of whom a large proportion would be masons. Ten days usually were allowed to elapse before the boarding was removed. Weeping-holes were formed by inserting 2-inch tile drain-pipes at intervals, and advantage was taken of these pipes to insert bolts during the construction of the walls for tying together the two sides of the frame. As showing the hardness of the rubble concrete it may be mentioned that in the case of one of the bridges on the Irvine line the abutments slipped forward and it became necessary to chip off a few inches of the face and reface them. Each quarryman employed could only on the average remove 5½ cubic feet per day.

The arches over the River Dochart on the Killin Railway in Scotland form an excellent example of the application of concrete construction to this type of bridge. This viaduct consists of five arches of 30 feet span on the square and of 42 feet measured on the skew, the angle of obliquity being 34°. The piers were built in rubble masonry laid in cement mortar, the arches being thrown in concrete. The piers, spandrels, and a part of the arch were first carried up to about five feet above the springing. The arches were then thrown, each in one day. The concrete, which was of the same composition as that already described, was mixed by hand upon a platform about 100 yards from the bridge, and was wheeled along a gangway to a point directly above the arch, where it was tipped over upon the centering. It was then carefully rammed in layers about six inches thick, the surface of the layers being kept perpendicular to the surface of the cleading, the layers themselves being at right angles to the centre line of the bridge, so that each layer corresponded roughly to a course of arch-stones. As the layers approached the crown of the arch they became more and more nearly vertical, so that some difficulty was experienced in keeping the surfaces perpendicular. Each of the arches was thrown in one day, which was an important point in obtaining thorough homogeneity throughout. The Board of Trade inspector, in order to satisfy himself as to the hardness of the concrete, sent men to drill holes through the arch, and found that the depth drilled was only about one-third of that which could be done in the same time through ordinary building stone.

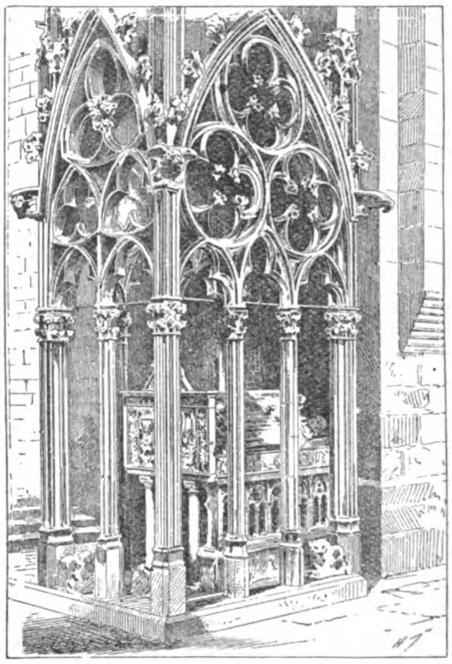
For smaller works, such as culverts, platform-walls, masonry-drains, etc., of which many are required of the same pattern on every contract, concrete is eminently suited, as the same moulds may be used again and again; it was not deemed necessary to use pure concrete for such works, and rubble concrete made with large flat stones radiating from the centre of the arches were employed.

A great economy is also effected in the dimensions of masonry structures when rubble concrete is used, as the volume may be reduced to 70 per cent of that required with ordinary masonry built in lime mortar, while at the same time the concrete gives greater strength. In order to compare the relative costs of material fairly, it is necessary under these circumstances to deduct 25 per cent from the cost of the rubble concrete per yard.

Concrete is also very suitable for the construction of engine and goods sheds and similar buildings in connection with railway works. A good example of its application to such buildings is found in the engine-shed at Ardrossan. The shed is 169 feet 6 inches long and 58 feet 8 inches wide inside, and accommodates twelve engines, there being four lines of rails. The side and end walls are constructed in bays of about 15 feet between vertical rolled columns, and are entirely of concrete made up of one part Portland cement to five parts of ballast. The method adopted was to clead both sides of the space (15 feet) between the columns with horizontal planks, put up one by one as the concrete was brought up, and then to fill-in the space between the planks with concrete, which was carefully worked against the planks on both sides to give a smooth surface. The concrete was brought up in layers of about 18 inches in depth. The walls are 10 inches thick, and flush inside and out with the columns. The rails are laid on longitudinal timbers 15 inches broad by 5 inches thick, and the cleaning-pit runs the whole length of the shed under each line of rails, being 3 feet 8 inches wide and three feet deep, below rail level. All the spaces between the lines of rails were covered with concrete 5 inches thick, draining into the cleaning-pits. There are three hydrants between each pair of lines of rails for supplying water for cleaning purposes. The height of the roof to the underside of the beams is 16 feet above rail level, and smoke traps are formed for each line of rails down to 12 feet 3 inches above rail level. The smoke is carried off by chimneys in each bay of the roof. The shed is entirely lighted from the roof, and is supplied with fittings for lighting with gas. The cost, with an adjoining range of buildings, consisting of offices, foremen's room, store, bothy, smithy and sand-drying kiln, was 2350*l.* There is a fifty-foot turn-table in connection with the shed.

In conclusion we have to acknowledge our indebtedness to Messrs. Strain, Robertson and Thomson, Westminster and Glasgow, for information on this subject. — *Engineering.*

A GERMAN TOWN AT THE MERCY OF AN ARTESIAN WELL.



A Tomb in the Monastery of the Holy Crosses, Taragona, Spain. From *La Construction Moderne.*

THE following tale copied from the New York *Sun* reads not a little like one of those hoaxes which are peculiar to American newspapers, but as it is interesting and not wholly improbable we give it for what it is worth:

The town of Schneidemühl, in the province of Posen, Prussia, recently bored an artesian well, and has suffered extraordinary calamity in consequence. Some experts have long predicted the catastrophe for whole regions of this country. One writer told in alarming detail recently how the whole of this continent east of the Rocky Mountains would surely one day be engulfed and destroyed through just such natural results of unnatural draining of the earth's interior fluids as has brought catastrophe to Schneidemühl. The case of the Prussian town has awakened great interest among scientists all over Europe, many experts have visited the scene and tried to stop the progress of the catastrophe, and public attention in large cities like Berlin, Paris and London has been strongly attracted to the danger the scientists tell of.

Some four months ago the municipal authorities of Schneidemühl, which is a manufacturing town of some ten thousand inhabitants, ordered the abandonment of a town-pump because during the cholera epidemic last summer the water fell under suspicion, and authorized the boring of an artesian well. A spring was struck at a depth of about 150 feet, but the water was impure. The pipes were rammed farther through the hard strata, and at a depth of 200 feet an immense volume of water gushed from the pipe. A big underground reservoir had been tapped, and the water, pressed on by the superincumbent soil, rushed through the artificial vent with such force and in such quantity as temporarily to flood the town, until it could be diverted into the river Kuedow. Then the pipe became clogged, the earth around it became loosened and the water began to ooze out at the sides. The borers were aware of the danger, and several experts were summoned. Larger pipes were ordered to be driven around the first, but by ill luck they did not arrive for a week or more, and by this time the orifice around the pipe had become of considerable width, and the water, bringing up great quantities of sand, seemed, if anything, to flow in increased volume.

On May 26, the pipe was drawn out and attempts to stop up the hole began. In the meantime underground rumblings, subdued grindings and explosions, and all sorts of subterranean noises were heard, and cracks appeared in the houses nearest the well. Bags of

sand were thrown and forced into the hole, and finally sand and stones were dumped in by cartloads, but all to no avail. Experts ordered a casing of brickwork to be made round the hole, to go down as far as the bed of clay. This was attempted, but could not be done. Herr Beyer, an eminent authority from Berlin, started to case in the hole the first week in June, but after a few days the whole casing sank into the hole. The workmen were at tea at the time, or they would have gone into the hole, too. Attempts were made to drive still larger pipes, but they struck stones, and still the water flowed like a big river, bringing up with it great quantities of sand, and even stones.

By this time the flow was so great the artificial channel could not carry it off, and the water began to flood the cellars of the houses. The cracks in the houses had grown steadily wider, until house after house collapsed. The last mail report of the progress of events in the unfortunate town says:

"This morning at three o'clock another three-story house fell in, luckily nobody being hurt. Up to now twenty-three houses have sunk and eighty families have been obliged to leave their dwellings. On Sunday morning the back wing of a large house fell, and the next morning the front. Several streets look as if there had been an earthquake. The roads show everywhere great cracks, and the houses look as if they had been thrown up by volcanic force. The pavement has, here and there, been torn up, and is covered with the débris of the houses. The buildings, in spite of being supported, project threateningly forward or lean on one side. Great cracks run through the gables and down the fronts of the houses, and continue across the streets and yards. From time to time thunderlike rumblings are heard underground. The ground trembles and the windows and door-arches fall in. The houses have sunk three-quarters of a yard."

The *Sun's* cable despatches since then have brought reports that the subsidence continues. The water of a great lake near Neustettin, in the same province, has sunk many feet. Experts from Berlin, Danzig and Königsberg have been at the scene several weeks, but nothing they can do avails to stop the flow of water from the chasm.

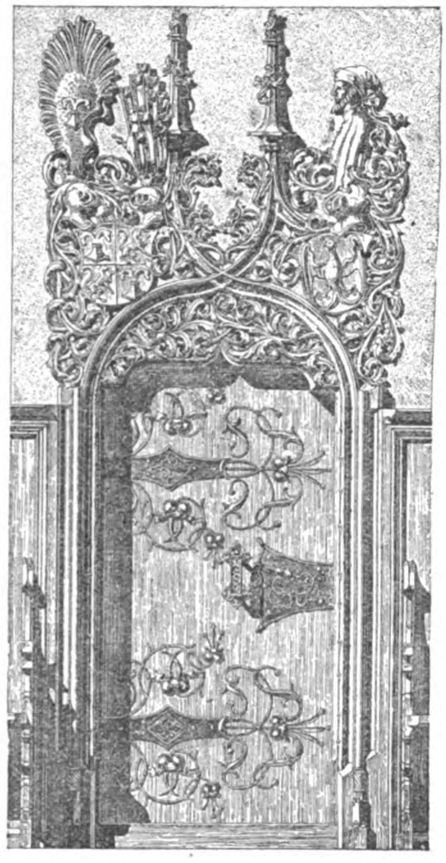
Savants say there is nothing remarkable about the occurrence. It is only that the expected has happened. The pipe tapped an immense subterranean reservoir of water. As long as there was no escape for the water it formed an incompressible stratum on which the upper earth rested in safety. It is the simple law of the hydraulic press. The compressed water under Schneidemühl bore up the weight of 200 feet of solid earth so long as there was no outlet for it, but the artesian pipe afforded a vent, and as the water rushed out, the yielding soil it had upborne sank down. Of course, innumerable conditions may contribute to prevent the earth from so subsiding. Strata of firm rock is one obvious condition. Some causes have intervened, for the case of Schneidemühl is the first of which the danger of subsidence, always theoretically recognized, has been realized to any serious extent. What will be the ultimate result at the unfortunate Posen town cannot be in any degree foreseen, because the extent of the underground reservoir or source of the supply of water cannot be known. Already the town is practically destroyed, for while the disastrous results are as yet confined to one area the inhabitants naturally are in a dread of a general collapse, either coming suddenly or by degrees, as the work of destruction has so far taken place.

It will be remembered that a Dakotan town had a few months ago an unpleasant experience of something of this nature. An artesian well was driven, and such a tremendous volume of water struck, that for several weeks the town was flooded and in danger of being actually washed away. But there was no subsidence of the earth, and in time the flow abated or was controlled.

The danger of so prodigally drawing the supplies of gas and oil from the earth has been often described by scientists, and dilated upon by alarmists. The writer mentioned in the beginning of this article adduced several columns of figures and seeming facts to show that the result of emptying the gas and oil reservoirs in Pennsylvania, Ohio and other States in the central oil region, would result in just such catastrophe as has occurred at Schneidemühl, but on an appalling continental scale. Deprived of its support, he argued, the vast area would surely some day collapse, the banks of the great lakes would be broken down, and the waters would rush over the continent to the Gulf of Mexico, engulfing and destroying half America. However, this may or may not be possible; the danger of subsidence from withdrawing subterranean supplies is a real one, and even now great alarm is being evinced in London over the possible, though not probable, result of tapping the water-bearing strata under the British metropolis.

A NEW TEST FOR LUNACY.— A curious case is the contest of the will of A. Gerald Hull, of New York and Saratoga Springs. He was estimated to be worth about $100,000, including a country seat at Saratoga Lake and an interest in the Hotel Brunswick in New York City. The "late diseased," as Sam Weller would put it, was, it, appears, a collector of relics, consisting of old guns, antique pistols, sabres, ancient armor, etc., and from this fact the lawyers for the contestants claim that he was not of sound mind, and consequently unfit to make a will. If this argument holds, what a vast army of lunatics, devoid of testamentary responsibility, there must be in the world, and what a harvest the probating of their wills would provide for the legal fraternity. — *The Collector*.

COMBINATION-HEATING.[1]



Door at Schloss Tratzberg. From Paukert's "*Zimmergotik.*"

IN selecting the matter of combination-heating as the subject of my discourse, I am free to confess that I did so with some misgivings. It is such a common fault, not only among heating engineers, but also among the other learned professions, to condemn that method or system which is foreign in its teachings from that particular system from which they derive their knowledge. Thus, the allopathic doctor condemns every move or treatment of the homœopathic doctor, and the Methodist minister claims that the Baptist minister is all wrong; that their particular plan is the only one that will insure salvation to the world-weary sinner: and yet the objective point with each differing school is the same; each doctor strives to cure his patient and each minister to save the soul intrusted to his teachings. It is only natural, therefore, with these precedents, that heating-engineers should condemn, almost unheard, systems of heating which are outside of their particular line.

You, gentlemen, call yourself master steam and hot-water fitters, and there is hardly a man among you who will not take a contract for either steam or hot-water fitting, and who will not acknowledge that each system has its particular merits, and each in its way is worthy of the careful consideration of any prospective buyer; and yet it is within my short recollection in this business when steam men declared war to the knife against hot-water heating, and the advocates of hot-water were equally strong in their condemnation of steam. To-day there is hardly a man among you who does not and will talk against and condemn from every point the system of furnace heating. It is said that furnaces are dirty, dusty and unhealthy, because they admit smoke and gas into the living-rooms. It is also said that a furnace burns the air, and that one side of a furnace-heated house is always cold, while the other side is too hot. Inasmuch as a combination-heater is a combination of a furnace and a steam or hot-water boiler, it is necessary for me to defend the system of furnace-heating against the calumny of its opponents. Taking the accusations — dirty, dusty and unhealthy — in their order:

SO-CALLED BURNT AIR.

It is a well-known fact that all systems of heating are dirty, and all systems of indirect heating are particularly so. The reason for this, as we all know, lies in the fact that dust is an ever-present quantity in air, although it may be imperceptible to the naked eye. Even in a darkened room, which is hermetically sealed to the influence of the outside air, the presence of dust is made discernible even to the naked eye by the admission of a ray of sunlight. This is the evidence of the unceasing changes which the material world is continually undergoing — the irrefragable proof that the visible matter of the universe is slowly and almost imperceptibly passing through a series of transmutations which affect both organic and inorganic nature.

In all systems of heating, both direct and indirect, where air is brought in contact with heated surfaces, these minute atoms of animal and vegetable matter, which are carried suspended in the air, are charred or burned by contact with the heated surface of the furnace or radiator, as the case may be, and this gives rise very frequently to the opinion (more particularly so in furnace work than in steam or hot-water) that we burn the air. Now, the air itself is not burned, as it is impossible to burn air without combustion.

I remember reading an interesting article several years ago in the

[1] A paper by Mr. George D. Hoffman of Chicago. Read at the Fifth Annual Convention of the Master Steam and Hot-water Fitters Association in Chicago June 7, 1893.

Scientific American, in which an elaborate test was made of this very subject. Air was taken from one receptacle and passed through, between and over wrought-iron plates, which were heated to an intensity of 2000° F., and then passed into another receptacle; and after the air had sufficiently cooled it was subjected to a chemical test and found to contain all the life-giving qualities that it had previous to its passage over these plates.

INDIRECT HEATING SYSTEM.

The theory of furnace, or any other system of indirect heating, is one of displacement — *i. e.*, all the air in a room or building to be heated by this method must be displaced by the warmer air from the furnace, and, as this air cools from contact with the cold walls and other surfaces in the room, it must in its turn be driven from the room by a further introduction of warm air from the furnace. With a sufficient number of open fireplaces, or other means of drawing off the cold air from the rooms, the flow of the air from the furnace or indirect radiator is continuous and natural, and if the supply of air to the furnace or indirect stack is from the outside, there is a continual flow of fresh dust as well as fresh air. As cheap, poorly constructed furnaces are not considered "in it" in this article, and as well-constructed furnaces do not leak gas, smoke or dust from their combustion-chambers, the above argument against the furnace on account of its being dirty is the only one that will stand the searchlight of unprejudiced investigation. Very few blessings are unmixed with evil, and in my opinion the blessing of an abundance of fresh air more than offsets the evil of the accompanying dust.

DRY AIR.

The main argument advanced to uphold the statement that the furnace is unhealthy is that it drys the air, thereby inferring that the original moisture contained in the air before its entrance into the heating-chamber of the furnace was lost by contact with the heating-surfaces of the furnace. We also very often hear this same argument advanced against steam-heating, but nothing can be farther from the truth. Air, when saturated with moisture, contains, at 32° F., one-one-hundred-and-sixtieth of its weight in water, at, 59° it contains one-eightieth and at 86° one-fortieth, doubling its capacity for moisture with each increase of 27° F.

We can readily see by the foregoing that instead of losing the moisture, we have simply increased the capacity of the air for moisture with increase of temperature. If allowed to remain in this condition the effect would not only be deleterious to persons occupying the room so heated, but the effects would be disastrous on the furniture and the woodwork of the room. It is a well-known scientific fact that rapid evaporation has a cooling effect, which enables one to withstand a much higher temperature without discomfort than would be possible in an atmosphere heavily charged with moisture. Thus we read every summer of numerous heat prostrations in New York, where the atmosphere is extremely humid with a temperature of not over 90° F., while in the high dry altitudes of some of our Western States a temperature of 100° to 110° in the shade is successfully withstood. In artifical heating a happy medium is the desideratum, and in all well-constructed furnaces ample provisions are made for supplying the extra moisture made necessary by raising the temperature of the air.

As to whether I have in the foregoing made a successful defense of the subject of furnace-heating is a question which you, gentlemen, must decide upon. In any event I shall drop this subject at this point from now on, and simply treat of the main subject of my discourse.

THE COMBINATION SYSTEM.

The word "combination" may be defined as the result of combining or joining together two or more different elements or systems into one harmonious whole. There are several distinct and different systems of heating, and the combination of any two of these systems into one would naturally result in a combination system. The specific form of combination-heating which I wish to treat of is obtained by a combination of steam or hot-water and air, or, as it is commonly called, furnace heat. The advantage of the combination system in buildings suitable to its use are manifold, but in order that these advantages may be made apparent, it may be necessary to diverge a little. Heat is supposed by many to be an actual and discernible substance, and until within a very few years even the more advanced students of natural physics were of the same opinion. Later investigation has shown that heat is nothing more nor less than molecular motion, consisting in case of air of nearly uniform rectilinear motions, with sudden changes in direction and velocity when the molecules come too near one another; in case of a liquid of irregular wandering of its molecules, and in case of a solid of orbital or oscillatory motions. By the foregoing definitions it will be readily seen that air will absorb heat much more rapidly than either liquids or solids, and as in combination-heating we are depending for fully 50 per cent of our heat on air heat, the natural conclusion is that a combination-heater will give results in the rooms to be heated much quicker than either straight steam or straight hot-water.

Heat is communicated from one body to another in three ways, viz: Radiation, convection and conduction. Radiant heat passes from one body to another at a distance through the air in straight lines and with great velocity, but it does not, to any appreciable extent, warm the air through which it passes. Conducted heat passes from one particle of matter to another at insensible distances, as an iron bar with one end in the fire becomes gradually heated at the other end. Convected heat is the movement of the heated body itself from one point to another, as the circulation of hot-air or hot-water. In combination-heating we again have an advantage over straight steam or hot-water, as we utilize in the rooms to be heated two of the three processes of heat distribution — *i. e.*, radiant and convected heat — while in steam or hot-water only the radiant heat is utilized.

VENTILATION.

One of the most important features of combination-heating is the fact that where the air-supply is taken from the outside, as it always should be, it insures a perfect ventilation throughout the building, as well as heat. The necessity for ventilation is very little appreciated by the general public, but as heating and ventilation have always seemed to me to be inseparable, and as the people naturally turn to our profession for their knowledge of these matters, it might be well for me to ask, What is ventilation, and why is it necessary? Ventilation is the act of replacing foul, impure air, in a confined space, with pure air. Please note that word "replacing." Times without number have I had people assure me that they had looked out for the ventilation of their house, as they had fireplaces in all the principal rooms. When asked if they did not know that "Nature abhorred a vacuum," and that their fireplaces would not exhaust unless there was some means provided for replacing the air thus removed, would reply, "They had not thought about that, but guessed there would be enough leaks in the doors and windows, anyway." I could cite any number of leading authorities and read whole chapters showing the necessities of ventilation and the vast consequences of the result of continued breathing of impure air, but a mere statement of the component elements of air will suffice for this article. If we divide air into 10,000 parts, its composition would be as follows: Oxygen, 2,096; nitrogen, 7,900 and carbonic acid 4 parts. When the proportion of carbonic acid in a room is increased from the normal amount of 4 parts in 10,000 to between 6 and 7 in 10,000, a faint, unpleasant odor is usually perceptible to one entering from the fresh air; if the proportion reaches 8 parts the room is said to be close. According to some authorities, a full-grown man at rest will exhale through the pores of the skin and from his lungs nearly three-fourths of a cubic foot of carbonic acid per hour. Taking a room containing 2,500 cubic feet of air in its normal condition, we find that the air contains one cubic foot of carbonic acid. Now, let us suppose this room to be a sleeping-room, not ventilated, occupied by two persons eight hours each night. If the windows and doors of the room were closed during the eight hours, the natural portion of carbonic acid would be increased to about 13 cubic feet (or 1 part to 200), and the occupants would arise in the morning with depressing headache. A person coming into the room from the outside would declare the air to be "foul," and a man does not need to be a crank on ventilation to reach the conclusion that such a situation would be anything but healthful. This condition could be obviated, to a certain extent, by raising the windows, but that practice is dangerous in results, is a prolific source of colds and sickness, and as a means of ventilation totally unreliable, not to mention the morning's discomfort of arising in a cold room. Accurate ventilation will replace the air in a given room every 20 or 30 minutes without draught.

FINAL ADVANTAGES.

I wish to call attention here to the reason why the combination-heater will from natural causes give more perfect and greater results in ventilation than it is possible to obtain from indirect steam or hot-water, more particularly hot-water. The force which we use to crowd the fresh air into the room and drive the foul air out is due to the expansion of the fresh air by heat. Air expands one-four-hundred-and-ninety-first of its bulk for every degree it is heated above 32° F.

Thus it will be seen if we heat the air 50° warmer than the surrounding air we have increased its bulk very nearly one-tenth. The greater the difference in temperature the greater the expansion, and, as a natural consequence, the more rapid the movement of the warmer air. On a moderate winter day the indirect radiator in a hot-water job is rarely heated over 130° to 140° F., and as it is not possible for the air in passing through the stacks to absorb more than from one-half to two-thirds of its heat, the temperature of the air flowing into the room under such conditions will rarely exceed 75° to 80° F. As the force with which the air comes into the room depends upon the difference in temperature of the air in the stack and the air in the room, it will be readily seen that the movement must be very sluggish. With the combination-heater, the air coming in contact with the fire and smoke surfaces only, the temperature is raised much higher, with the result of a rapid flow of a large volume of air into the room in question.

Now, one more point, then I am through. In installing a combination job great care should be taken to place the heater as near the center of the work as possible, locating all air-registers as near the heater as practical, so as to insure short connecting pipes in the basement. Always locate registers away from windows or cold walls, selecting, if possible, the warmest side of the room. Cold and warm air are always antagonistic, and you should give the warm air all the advantage possible if you wish for the best results.

Lastly, the combination system of air and water heating particularly is in the market to stay, and to you who are interested in residence or school heating the subject is worthy of your most careful consideration.

UNITED STATES PITCH-PINE INDUSTRY.

THE British Vice-Consul at Pensacola says that the immense quantities of pitch-pine wood hewn, sawn and manufactured, which have been shipped from the United States — notably to the United Kingdom — for so many years past, and which are still being shipped without any diminution, leave it apparent that information on this subject, generally, and particularly on the probable length of time that these pitch-pine forests will hold out, will be of value and interest to the principal dealers in this great article of trade. The pitch-pine trees of the Southern States are of spontaneous growth, and especially indigenous to those sandy soils near to the water of the Gulf and Atlantic coasts, and, therefore, hardly any attention is given to the culture of these trees. It is believed that the pine wood of the Southern States is coming more and more to the front, and that it is the most valuable wood of the country for mercantile purposes, and that, as the white wood of the Western and Eastern States becomes exhausted, the Southern States will be more relied upon. It is stated by the Forestry Bureau of the Department of Agriculture in the United States that there are about ten species of merchantable pine in the Southern States: the white pine and pitch-pine, the scrub or spruce-pine, the sand-pine, the pond-pine, the cedar-pine, and the long-leaf, short-leaf, loblolly and Cuban pines, which are the principal varieties in general use. There is a great deal of confusion arising from the indiscriminate use of local names for these timbers. Thus the long-leaf pine is called yellow pine, hard-pine, pitch-pine and various other names, but the settled name of this species of wood for commercial purposes at Pensacola is pitch-pine, and this quality of wood forms the largest if not the entire bulk of the shipments of pine wood from Pensacola. The short-leaf is called the old field and spruce-pine, the loblolly fuel-swamp, sap-pine and Virginia pine. The most important of these woods — the long-leaf pine — grows in the Atlantic and Gulf States, at some distance from the coast, covering a belt of about 125 miles in width. Next in importance to the long-leaf pine — pitch-pine — is the short-leaf pine, and this is more widely distributed than any of the other growths of pine. It is the predominating growth in some of the Southern States, and it covers immense areas to the exclusion of almost every other tree. In Florida the short-leaf pine is found along the northern border of the State. In Western Florida, nearer to Pensacola, it approaches the Gulf within twenty-five miles. It is said that the short-leaf pine gives from 3,500 to 4,000 feet, board-measure, per acre. A rough estimate places the possible standing timber of this species, distributed throughout the Southern States, at about 160,000,000,000 feet, board-measure. The loblolly pine is found only in the northern part of Florida, and the Cuban pine is found principally in Florida and along the Gulf coast. It grows mainly on the so-called pine flats or pine meadows. About twelve years ago the official estimates of the merchantable pine timber standing in the Southern States gave a probable quantity of 225,000,000,000 feet. Since that time there has been an enormous quantity of timber cut, but the amount standing now is estimated as follows: Long-leaf and Cuban pine, 232,000,000,000 feet; short-leaf pine, 160,000,000,000, aud loblolly pine, 102,000,000,000 feet, making a total of 494,000,000,000 feet, board-measure. The long-leaf pine is known to be superior to all the other species in strength and durability. In tensile strength it is said to approach, and perhaps surpass, cast-iron. In cross-breaking strength it rivals the oak, requiring, it is stated, 10,000 pounds pressure per square inch to break it. In stiffness, it is superior to oak by from 50 to 100 per cent. It is best adapted, and much used, for the construction of heavy work in shipbuilding; the inside and outside planking of vessels taking the deals and planks of the best quality. For house-building it is used almost entirely in the district of Pensacola, and in buildings for railroads, railroad cross-ties, viaducts and trestles, this wood is foremost. The finer grades and the "curly" woods are very much used for the timber-work in the best dwellings. The hardness of this wood especially fits it for planks and flooring. The finer grades of curly-pine are used for the manufacture of furniture, and it is said that for bedsteads it is admirably adapted, as the resinous wood prevents the inroads of insects and similar pests. The resinous products of pine wood supply many parts of the world with pitch, resin and turpentine. And, contrary to opinion formerly held in this respect, it is said that the tapping of the pine tree for turpentine strengthens, instead of weakens, the wood. The Cuban pine is like the long-leaf pine, and is used in trade to a large extent. The short-leaf pine is a softer wood, and is more easily worked. This wood is admirable for house work, and is largely used by builders and cabinet-makers, and for other purposes. The loblolly pine is suited for rougher work than the other two species, but it is not so strong, and it will not last so long as the others. It is stated, in a recent report of the United States Department of Agriculture, that in respect of the pine forests of the Southern States, the supply is good for fifty years to come. — *Journal of the Society of Arts.*

BOOKS AND PAPERS.

MR. BIRKMIRE'S work on Skeleton Construction[1] is so good as far as it goes that one cannot help feeling a regret that it does not go a great deal farther. It is almost the first published work on the subject, and coming from one who is so thoroughly posted and so eminently qualified to make a profitable selection from the quantity of work which has been executed in this line during the past few years, it could reasonably be expected that the scope of the book would be much more extended than it is. In so far as concerns the general theory and to a certain extent the practical application of the skeleton construction to tall buildings, the book is complete, but since the science of building in this manner is still in a tentative state and experiments are being tried with nearly every new building which is erected, it is evident that architectural engineers change their minds frequently upon the subject, and endeavor in each succeeding building to improve upon the past. Therefore, the best way to enunciate the theory apparently would be to illustrate copiously existing examples. This Mr. Birkmire has not done. And, furthermore, had he been more willing to draw from other people's practice instead of limiting the illustrations chiefly to work which has come under his immediate supervision, while possibly the book would not be as coherent in plan, it would be much more valuable to the architects who are seeking for the latest achievements and the best devices in the construction of buildings on the skeleton system. With the exception of two unimportant details from the Fair Building and the Ashland Block in Chicago, the only work illustrated outside of New York is a portion of the wind-bracing of the Venetian Building in Chicago, all of the other examples being confined to New York. Such Chicago buildings as the Masonic Temple, which is remarkable for the manner in which it is braced and strengthened against wind-pressure no less than on account of its enormous height; the German Opera House, which is said to be one of the best pieces of architectural engineering in the country; the Old Colony Building, which is equally valuable; not to mention a score of others in the western metropolis, are entirely ignored by Mr. Birkmire except in so far as he casually mentions that such buildings exist. And although he states very authoratively that, considering the present rapid development of the skeleton construction and the necessity for high buildings, New York City takes its place at the head, not only in the designs but in the details of the construction, it is doubtful if architects elsewhere throughout the country would be inclined to entirely agree with him. The skeleton construction has been not improperly named after the city where it was first used, and whatever may be urged against the artistic qualities of the Chicago work, or however much the system may be abused in Chicago by incompetent constructors, Chicago, nevertheless, more than any other city, presents examples of engineering achievement in the use of skeleton construction which are far ahead, in the aggregate and in detail, of New York. In both practical and theoretical solutions the best of the Chicago buildings are far more successful than the New York ones, in that the former deal with actual loads and actual conditions, and the steel and masonry work is exactly proportioned to the duties to be performed; whereas in New York, partly on account of the provisions of the building-law and partly on account of the so-called conservatism which seems to lag behind the march of Western progress, the buildings are not exact engineering problems, but are rather massive constructions in which the metal is so far in excess of actual requirements that while the architects' commissions and the steel workers' profits may be eminently satisfactory, the buildings are really no better for it, and such over-calculated construction cannot fairly be called scientific. For instance, in the Venetian Building, Chicago, the dead weight of the floors is taken at 100 pounds per square foot, the live load on the first floor at eighty pounds, and the floors above at sixty pounds. The whole of the dead load and about one-half of the live load is carried onto the columns, making the live load per foot on the upper floors borne by the columns equal to thirty pounds. Whereas in the Havemeyer Building in New York the total loads are assumed at 200 pounds per foot, and the construction in each case being practically the same, it follows that one building is calculated for a live load of more than three times what is considered sufficient in the other. Consequently one of the two must be very badly miscalculated. Nor is the difference in principle between New York and Chicago practice confined to floor and column loads. In the Home Life Insurance Building, New York, the walls in the first and second story are made twenty-four inches thick, third to sixth twenty inches, sixth to tenth sixteen inches and above that twelve inches. The function of walls in this construction being simply to protect the steel work, it follows that if a twelve-inch wall is thick enough for the upper stories it ought to be thick enough for the lower, and consequently the masonry is nearly twice as heavy as it ought to be, so involving heavier columns, heavier beams, heavier foundations and larger bills to pay.

However, the unit loads on the floors and the thickness of walls are points which Mr. Birkmire enumerates without criticising one

[1] "*Skeleton Construction in Buildings*," by William H. Birkmire, New York: John Wiley & Sons.

way or another, and certainly, as illustrating New York practice, the book is exceedingly valuable. The Home Life Insurance Building, Havemeyer Building, Jackson Building, the New Netherlands and the Waldorf are fully illustrated, with details of joints, girder-connections, columns and beam-plans, together with very complete abstracts of the iron and steel specifications. The author is so eminently practical that the book is full of suggestions which, independently of the particular theory which might be followed in figuring the building, would apply to such constructions East or West. A few such taken at random will illustrate the useful character of the book. He recommends that angles and plates in columns and girders be whole from end to end and that in determining the sizes of beams for floor construction the proper way is to fix upon the loads which the floor-beams must carry and then determine the spans by the loads which will strain the beams to the allowed fibre strain, so that the whole construction will be loaded and strained equally in all parts. All connections should be riveted at the works or the building with hot wrought-iron or wrought-steel rivets, thus insuring more rigidity against wind-pressure than can be attained with bolt connections, and at the same time largely increasing the efficiency of the beams. All the beams should be rigidly secured, that is to say, each beam should be fastened at both ends by being connected by knees, or so firmly secured that the connection will not be severed if the beam is exposed to the ultimate load. In this case the beam is of the same character as if continuous over several supports or as if consisting of two cantilevers, the space between whose ends are spanned by a separate beam. A beam thus rigidly fixed at both ends and uniformly loaded will sustain a total load one and one-half times that of a beam which is simply supported at each end and secured against deflection sidewise.

Skeleton construction is still too recent an innovation in building practice to consider it as in any way perfect. As a system, many architects are opposed to it. Nevertheless, its use is every year extending, and it is now practically admitted that no other construction can be so economically applied to buildings over seven or eight stories in height. Nor is there, all things considered, any construction which is so rapid in execution and when properly applied so rigid and secure. The East has only just begun to appreciate the possibilities which this construction places within the reach of the architect, and Mr. Birkmire's book is greatly needed at this time. It is to be hoped that he will see fit to supplement it at a later date by a more extended illustration of methods in use elsewhere than in New York.

SOCIETIES

THE ENGINEERING ASSOCIATION OF THE SOUTH.

AT the meeting of the Engineering Association of the South, Nashville, Tenn., July 13, the subject of "Smoke Prevention" was presented by Prof. Olin H. Landreth, of Vanderbilt University. The paper discussed successively the causes, the effects of smoke and the remedies for it. Objectionable smoke comes mostly from bituminous coal, other fuels producing very little smoke. When fresh coal is thrown on incandescent coal, there at once begins the distillation of the more volatile hydro-carbons, which distilled matter is burned if sufficient oxygen is present and the temperature is sufficiently high, but which otherwise passes up the chimney as yellowish fumes. As the fresh coal becomes more highly heated, the less volatile hydro-carbons are distilled, and are decomposed at a temperature much below that necessary for the combustion of the carbon liberated, about 2,000 degrees F., a temperature so high as to give considerable margin of opportunity for this portion of the carbon to escape unburned. It is this free unburned carbon in a finely divided state that, while incandescent, produces the luminous flame and, when cooled, the clouds of smoke that issue from the chimney and afterwards settle as soot. After the volatile matter is driven off, the fixed carbon remains and in burning produces but little flame and no smoke, since the particles of carbon are not detached from the solid mass till combustion takes place. As to the effects of smoke-production, the fuel-loss in the smoke itself is but small — estimated at one-sixth of one per cent: but the causes of smoke are also the causes of imperfect combustion and consequent waste of fuel in the form of invisible gases, carbonic-oxide and light hydro-carbons, and the presence of smoke indicates this parallel waste. Aside from the fuel-waste, the effects of smoke outside the furnace make its abatement of public interest. It is authoritatively stated that the residuum of smoke in the lungs induces consumption of an incurable character; and that, in the city of Pittsburgh, Penn., the death-rate was 1.62 per 1,000 lower during the eight years in which the use of natural-gas almost freed the city from smoke, as compared with the preceding eight years; and that, since the partial return of smoke, the rate has increased 2.57 per 1,000. Carbon in a finely divided state is an easy vehicle both for noxious gases and organic impurities. The insidious soot pervades and defaces public and private buildings and calls for fruitless efforts for cleanliness, when cleanliness is impossible. Smoke is objectionable from the loss of light and increased cost of artificial light; also from the repression of æsthetic tendencies and consequent mental and moral discouragement. Consideration of the causes suggests the agencies and the mechanical devices for the prevention of smoke; these latter, so far as pertains to steam boilers, are classed as mechanical-stokers, air-flues in the walls and grate-bars, coking-arches, dead-plates, down-draught furnaces, steam-jets for injecting air and mixing the gases, baffle-plates and double furnaces. Smoke-prevention must be accomplished by educating the public to consider smoke a nuisance that unquestionably can and should be abated, for the smoke-producers are very slow to be convinced that this abatement is to their interest. Following the influence of public sentiment, laws are to be enacted and provision made for their enforcement and for furnishing to smoke-producers, when desired, professional advice regarding the means and appliances for smoke-prevention. The paper gives the statutes passed in Chicago, Cincinnati, Cleveland, Pittsburgh, New York, Rochester, Boston, Denver, State of Ohio, and City of Birmingham, England, with statements of the success attained in preventing smoke in these localities, success in each case being proportional to the vigor of action taken; it also contains descriptions of various mechanical devices for smoke-consumption and closes with a list of the literature on the subject.

The next meeting of the Association will be held September 14.

WALTER G. KIRKPATRICK, *Secretary.*

THE ILLUSTRATIONS

[*Contributors are requested to send with their drawings, plans and a full and adequate description of the buildings, including a statement of cost.*]

DWELLING-HOUSE, CORNER FOLLEN ST. AND CONCORD AVE., CAMBRIDGE, MASS. MESSRS. LONGFELLOW, ALDEN & HARLOW, ARCHITECTS, BOSTON, MASS.

[Heliochrome, issued with the International and Imperial Editions only.]

TRINITY CHURCH (CONGREGATIONAL), EAST ORANGE, NEW JERSEY. MESSRS. STEPHENSON & GREENE, ARCHITECTS, NEW YORK, N. Y.

THE building takes up the whole width of the lot except one foot on one side and a driveway on the other. The cut of the floor-plan shows the general arrangement of the whole building. There are three entrances to the new auditorium, one in the tower, another on the south side, and the principal one on the street under a wide arch and through an open porch with tiled floor. Both the tower and principal entrance lead into a spacious vestibule with six windows on the front, and doors leading into the auditorium and into the reading-room. The pulpit platform is placed on the north side, so that the part of the old building that is retained can be opened into the auditorium with wide sliding-doors fifteen feet high, thereby adding largely to the seating-capacity of the building for special occasions. The treatment adopted was suggested by examples of the round-arched French Gothic. All the new auditorium is built of an unpressed buff brick of an uneven color, with trimmings of terra-cotta a shade lighter than the brick. The roofs are covered with light greenish-gray slate. The tower rises at the southwest corner, where it will give prominence to the building from both directions. It is of brick to the belfry floor and above of terra-cotta. The tower has a low spire surmounted with a wrought-iron cross. The new auditorium is cruciform, the roof-trusses of the nave and transepts coming down on the large clustered piers near the entrances. The roof is open to the ridge, is ceiled up with narrow boarding and is carried by richly worked trusses resting on turned columns, with diagonal trusses where the nave and transepts cross. The new auditorium will seat four hundred and forty-six persons. All the new building will be wainscoted. The pews and interior finish, except roof-trusses, will be of dark oak. The building will be heated with steam, principally by the "indirect" method, and will be ventilated by drawing the air out under the floor and passing it off through the large ventilation-shafts.

REMODELLED CHAPTER-HOUSE OF THE DELTA KAPPA EPSILON SOCIETY, MIDDLETOWN, CONN. MESSRS. BARRETT BROS. & COMSTOCK, ARCHITECTS, HARTFORD, CONN.

THE roof of present building to be removed and attic story of same raised up so as to make another story. New cornice and roof as shown on perspective to take the place of old roof. New cornice, roof and cupola added in place of old one. New rear and front verandas added. The rest of the building on the exterior practically the same as at present. The building is a granite building. Cornice, balustrading, cupola, etc. to be of wood and painted white, and the interior has been quite extensively re-arranged.

A SKETCH FOR EFFECT. COMPOSED BY MR. C. ALOIS HERMAN, ST. LOUIS, MO.

BUSINESS BLOCK FOR MESSRS. HUMPHREYS & HUGHES, AND H. F. RUMP. VAN WERT, O., MESSRS. WING & MAHURIN, ARCHITECTS, FORT WAYNE, IND.

BUILDING is to be built of Indiana Oolitic stone and costing $20,000.

[Additional Illustrations in the International Edition.]

SOUTH-EASTERN HOTEL, DEAL, ENG. MESSRS. JAMES BROOKS & SON, ARCHITECTS.

THE site for this hotel has been chosen so that the building will be detached, and from two of its fronts there is no interruption to a view of the sea. The principal front is approached from a wide street and esplanade extending from Deal Castle to the Pier, about two miles long.

The building consists of basement, ground-floor, first and second floors and attics. Fireproof floors are to be used in three of the stories. The basement contains the kitchens, scullery, pastry-rooms, room for cooking vegetables, pantries, larders, room for uncooked meat, fish, etc., wine and beer cellars, two large boilers for heating and cooking purposes, a billiard-room, card-room, bar, lavatories and water-closets. The ground-floor has a deeply-recessed porch, and a large hall filled with lounges, and which will serve as a smoke-room. A wide corridor extends the entire length of the building. The dining-room is on the right hand, with a canted end, designed to give a view of the shipping in the Downs; in connection with this room is a servery, still-room, and service-room and lifts from the basement. On the left of the entrance is a private dining-room, a large room for the golf club, having a canted end similar to the one in the dining-room, giving a commanding view of the sea and Deal Castle. There is a large billiard-room, a bar, and office, lavatories and water-closets, with a staircase to the bedrooms over. Immediately opposite to the principal entrance is the manager's room, a lift, the principal staircase, and reached from the half landing are a lavatory and water-closets for ladies.

The wing in Ranelagh-road has two private sitting-rooms, stores, linen-room heated with hot-water, a staircase to basement and rooms on the upper floors.

The first floor contains a large drawing-room and balcony, six large private sitting-rooms, and nine large bedrooms, a ladies' bath-room; there are also a bath-room and water-closets for gentlemen. The second floor contains nineteen bedrooms with ladies' water-closets and bath-room, and water-closets and bath-room for gentlemen. The attic floor contains fourteen good bedrooms. The servants' bedrooms are in the wing next Ranelagh-road. Especial attention has been given to the lighting, heating, ventilation and sanitary arrangements. There are linen-rooms on each floor fitted with hot-water pipes for airing the linen. There are also housemaids' closets for each bedroom floor, with hot and cold water laid on. The materials for the facings are red bricks, with Ancaster stone freely used for dressings, etc.

The South-Eastern Railway has given the scheme its active support. Three of the Directors and Sir Myles Fenton, the General Manager, are upon the Directorate.

The drawing was exhibited at the Royal Academy, and this plate is copied from the *Builder*.

NEW PUBLIC OFFICES, DALHOUSIE SQUARE, CALCUTTA, INDIA. MR. W. BANKS GWYTHER, ARCHITECT.

THIS fresh addition to the architectural attractions of the City of Palaces occupies a prominent position at the northwest corner of Dalhousie Square, alongside the Post-office with its prominent dome and massive colonnade. This square is now nearly surrounded by imposing structures and is rightly acknowledged to contain the finest group of modern architectural buildings in the East.

The New Public Offices were designed to accommodate the departments under the Commissioner of the Presidency, the Collector of Calcutta and the Collector of Income Tax. The plan of the building is rectangular with a court-yard in the centre, the front portion overlooking the road, and which forms the subject of our illustration, being three-storied with a Mansard roof over it, the two sides or wings being partly two-storied and partly single-storied, and the back or end block entirely single-storied. The Collector of Calcutta who has large dealings with the public has his offices to the left of the main entrance taking in the ground-floor up to and including the whole of the back or end block, also the left portion of the first floor. The Collector of Income Tax occupies the ground-floor on the right side as well as the corresponding portion of the first floor. And the Presidency Commissioner is accommodated in the main portion of the first floor and also occupies the whole of the second floor.

The rooms to which the public have access are all on the ground-floor and are very conveniently grouped round the central court or quadrangle; the internal arrangements in regard to ventilation, lighting and counters, etc., for the transaction of business have been well devised. These offices are worth a visit both on account of their architectural as well as their practical excellence.

The design externally is a study in red brick with light red terra-cotta dressings and is, we consider, a happier scheme than the alternative terra-cotta treatment in buff color of which there are several examples in Calcutta. The façade consists, as our illustration shows, of a central feature of which the large entrance archway is the key: the coupled Doric columns flanking it, lead up to the entablature which runs along the level of the first floor and forms an appropriate band crowning the *rusticated* basement or ground floor. The end towers supply another feature in the façade and give a key to the rest of the treatment. The massive but well-proportioned main cornice makes a most suitable finish to the three stories which are comprised in the building and the Mansard roof impresses a character on the whole, the elevation as seen from any position in Dalhousie Square being effective and harmonious, neither dwarfed by, nor itself overpowering, the adjacent buildings.

The designs were prepared in the Public Works' Department. The plate is copied from *Indian Engineering*.

NEW RAILWAY STATION, HALLE, GERMANY.

THIS plate is copied from *Zeitschrift für Bauwesen*.

SECTION OF THE SAME STATION.

HOUSE AT COLOGNE, GERMANY.

THIS plate is copied from *Architecktonische Rundschau*.

CHÂTEAU DE MARTIN-WAST, NEAR CHERBOURG, FRANCE.

THIS plate is copied from *La Semaine des Constructeurs*.

SKETCHES MADE AT VICTORIA HOUSE, WORLD'S FAIR GROUNDS, CHICAGO, ILL. MR. R. W. EDIS, ARCHITECT.

THIS plate is copied from the *British Architect*.

NEW RESIDENCE, WOKINGHAM, ENG. MR. GEORGE W. WEBB, F. R. I. B. A., READING, ENG.

THE residence which forms one of our illustrations to-day is in course of erection for Mr. H. B. Blandy, on an elevated site near Wokingham, Berks. The facing bricks are of a deep-red tint, specially selected from Messrs. Lawrence & Son's kiln at Bracknell, with ornamental tile-hanging and moulded-brick cornices, etc., to first floor, and half-timber oak-work in gables filled-in with thin bricks laid to pattern. Dark tiles are used for roofing.

SHOP AND DWELLING, TOTTENHAM-COURT ROAD, LONDON, ENG. MR. FREDERICK WALLEN, ARCHITECT, LONDON, ENG.

THIS house has been erected for Mr. James Elmy, china and glass merchant, at the corner of University Street. The materials of the front are red brick and Doulting stone. The site is about 48′ x 19′ 3″, the basement used for warehousing extending 12′ in addition to these dimensions. The contract for the building was 2,300*l.*, and for the vaults under street 515*l.*, and the total cost is about 3,000*l.*

RESIDENCE, LICHFIELD ROAD, ERDINGTON, ENG. MESSRS. ESSEX, NICOL & GOODMAN, ARCHITECTS, LONDON, ENG.

THIS residence is now being erected for Dr. Aspinall by Messrs. Bishop & Charles, builders, of King's Heath, near Birmingham. The elevations are being carried out with light-colored red bricks and red Hollington stone dressings; the ornamental brickwork and quoins are of cherry red Bracknell rubber bricks, and the roofs are covered with brown brindled tiles.

AUGSBURG.

CORRECTION.

"THE Memorial Arch" published in our last issue as erected at Norfolk, Virginia, was designed by the architects, Messrs. Carpenter & Peebles of that city, for erection at the University of Virginia, near Charlottesville. The inscription being "To the Memory of Her Sons Who Died in Battle." We regret that a mishap in printing, which escaped notice at the time, deprived one of the authors of this design of a large and important portion of his name.

RESULT OF THE SPITZER SALE.—The auction of the Spitzer Collection has ended, and the amount received has amounted to 9,107,931 francs, or about 365,000*l.* The experts who calculated the value of the collection at 400,000*l.* were not far out, for in such cases it is impossible to foresee what may happen, and the biddings for many objects are likely to exceed the market value. It denotes the power which antiquity still possesses when we find collectors from many parts of the world struggling for two months in the hope that they may carry off treasures. It is generally understood that an Australian, Mr. George Salting, has been the hero of the auction, for his captures have excited the envy of all rivals. Thanks to him, it may be calculated that Great Britain secured a third part of the objects, France another third, and Germany, Austria and Belgium the remainder. The collection of arms has yet to find its way under the hammer, when probably three millions of francs will be obtained by the representatives of M. Spitzer. The proceeds of the sale are sufficient to prove that there is little difficulty in finding enormous sums to gratify the passion for acquiring bric-à-brac. —*The Architect.*

COMMUNICATIONS

[*The editors cannot pay attention to demands of correspondents who forget to give their names and addresses as guaranty of good faith; nor do they hold themselves responsible for opinions expressed by their correspondents.*]

A QUESTION OF COMMISSION.

Altoona, Pa., July 13, 1893.

To the Editors of the American Architect: —

Dear Sirs, — Will you kindly answer through the *American Architect* the following questions? A firm of architects agreed to draw all plans and superintend the construction of a certain public building. The contractor claimed the work was completed but the architects refused to accept it, but consented that the viewers should be appointed by the court and if they were satisfied they (the architects) would enter no further objections. The viewers were accordingly appointed and sustained the decision of the architects. The commissioners then formally instructed the architects to enter upon and take possession of the work; hire men and purchase material and to complete the building according to the terms of the specifications. After several times refusing they did as requested and had the work done to the satisfaction of the viewers. The trouble and worry and enmity (of the parties interested) was of far more consequence than the actual work involved on the part of the architects. Now will you kindly say what you consider a fair and reasonable charge for the extra work caused by acting as the commissioners' agents. Two per cent is in the opinion of the said architects a very reasonable amount. Yours truly, Architects.

[Two per cent seems to us a very moderate charge for the extra work involved in this transaction. — Eds. American Architect.]

NOTES AND CLIPPINGS

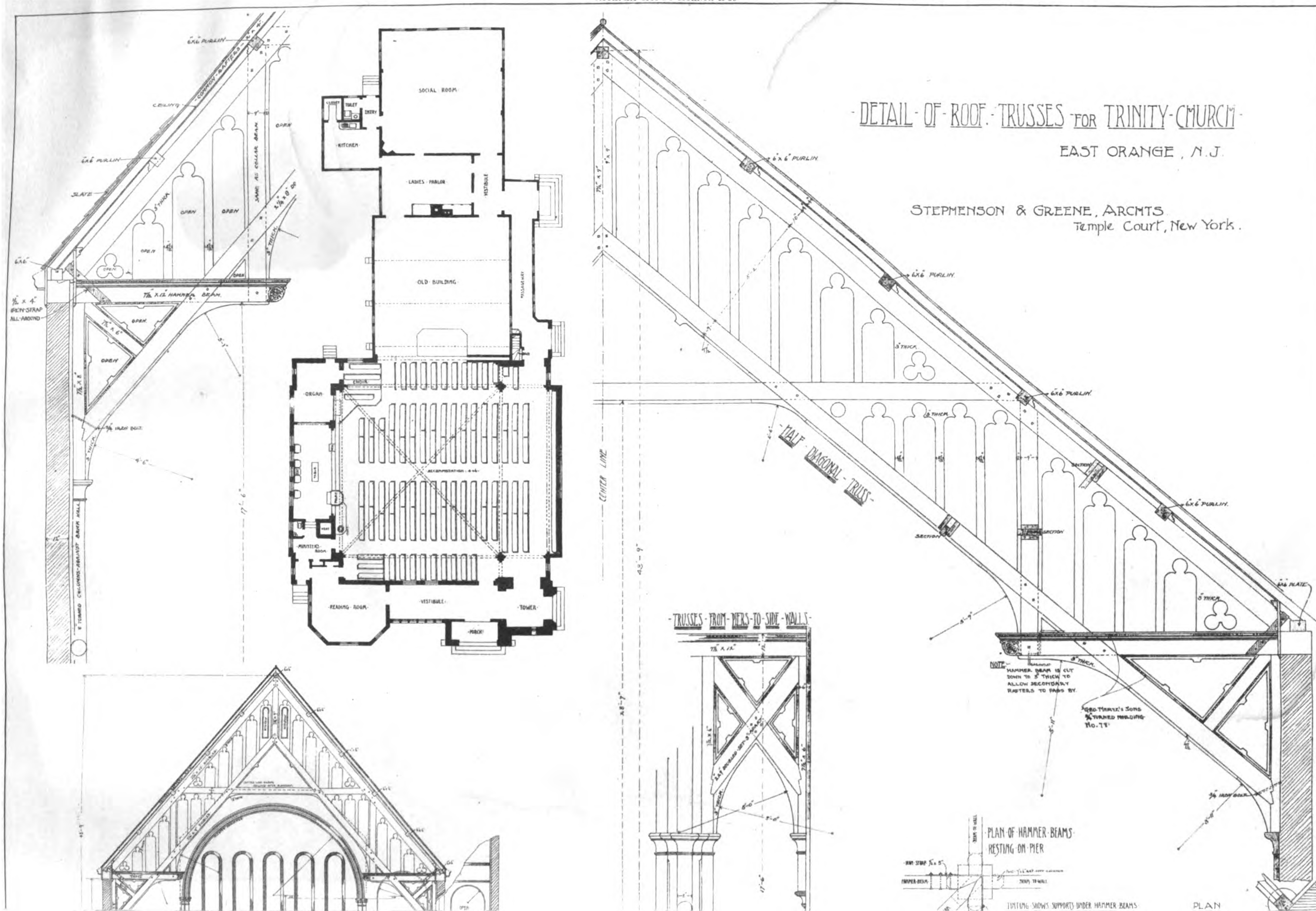
Glass-lined Bearings and Glass-lined Pipes. —Although American plumbers and steam-fitters make great game of the English practise of putting pipe together with flanges, there are certain advantages in the method which cannot be overlooked, and which are strongly brought out in a set of circulars which are before us in regard to Ryland's Glass-lined Tubing and Block Bearings. The glass bearings in general seem to take the place of brass, being very much the same shape as the brass, except that those illustrated in the circular are square outside and are divided into four pieces, a construction which is doubtless necessary on account of the nature of the glass. The glass used for these bearings, being of a very strong and durable nature, has been applied not only to the lining of bearings but the lining of pipes. Some years ago a device of this kind was introduced into America, but it failed on account of our general system of piping. Instead of having pipes cut to definite lengths and coming together with butt joints, our American method is to screw them into fittings an indefinite distance, leaving a space between the ends of adjoining pipes, or, in the case of elbows, leaving an ill-defined space in the fitting between the end of the pipe and the body. With the flange-system of fitting the pipe the glass lining can be made of a definite length, and when brought together a firm square joint is made, and the glass can be left with surface to surface without exposing the iron. In this country it was found that it was impossible to cut the pipe outside the factory without shattering the lining, and when once it was cracked, broken or chipped, the rusting of the iron would take place, becoming so severe that the pipe was worse than useless. Tin-lined iron pipes suffered from the same objections, and a complete set of washers for the protection of fittings and joints had to be made from tin in order to cover this objection. When Robert Briggs designed the American pipe-thread he produced one of the neatest mechanical and practical results that had ever been seen in this particular line. Unfortunately, although thanks to his ingenuity and foresight pipe-threads will match all over the country, yet the extreme accuracy which was necessary for perfect workmanship with his system has brought about a series of difficulties in the way of securing fittings which make it out of the question to do a perfect grade of work. At least it is not possible in the general and commercial work to cut pipe for a job in the shop and put them together outside. All these glass fittings, even where screw connections are made, are arranged so that the pipe, the glass, the cement, by which the pipe is held, and the iron come together surface to surface, and are not dependent upon the length of the threaded portion forced into the fitting. Practically the glass-lined screw fittings are arranged on the principle of a union coupling. This slight modification of the system of putting together overcomes almost entirely the objections to the use of glass-lined pipes. Aside from giving a perfectly pure and clear pipe, the friction required to pump through such a pipe is estimated by the best engineers to be at least 25 per cent less than that needed with ordinary piping. It is found that, with ordinary rough work, that amount of extra friction is produced by the roughness caused by the ends of the pipe not touching and by imperfect fittings. These pipes are made of wrought-iron, with socket couplings, in 6-foot lengths, in sizes from ¼ to 3 inches in diameter. The union couplings are made from ½ to 4 inches in diameter, and cast-iron, in 6-foot lengths, from 1 to 4 inches. All these different styles can be had in 9 12 or 18 inch lengths, with elbows, tees, equals or reducers of any required diameter. In fact, a whole pipe-system is available with the glass lining. Where flanged joints are used of cast-iron they are faced, and in this way perfectly graded lengths are available. They are used for chemical purposes where water entirely free from lead is desired, in breweries for corrosive liquors, for handling fluids which are to be used medicinally, etc., and for conduits for electric-light couplings. Their advantages are such as to call for close consideration from manufacturers in this country. — *Metal.*

Large Concrete Piers. — In building the piers of a bridge across the Red river, the Chicago, Rock Island and Pacific Railway resorted to the expedient of making monolithic piers of concrete in the absence of stone of the proper kind. These piers were made by first sinking at the site of each a caisson or box of wood 32 by 13 feet in size through the sandy bottom to rock, which was easily done by weighting the caisson and then pumping out the sand and gravel previously loosened by means of a jet of water. These caissons were then filled with concrete made of one part of Louisville cement, two parts of sand and four parts of stone broken to pass through a ring two and one-half inches in diameter. After the caisson was filled a mould of 2-inch plank was made of the form of the pier. At the bottom it was 29 feet 10 inches long and 11¼ feet wide; at the top it was 8 feet 2 inches wide and 26 feet 8 inches long, with semi-circular ends. Inside these moulds concrete was placed composed of 400 pounds of German Portland cement, 10 cubic feet of sand and 1 cubic foot of broken stone, which was allowed to harden thoroughly. The plank mould was then removed and the surface covered with a mortar of equal parts of Portland cement and sharp sand. The river could be forded nearly all the time the work was in progress and was sometimes almost dry, although occasionally the water would rise to a depth of twenty feet, and the bottom lands in the neighborhood would be flooded for a distance of two miles. — *Providence Journal.*

TRADE SURVEYS

It is remarkable how well the industries are passing through the present depression. The reason, of course, is that the country is earning enough to supply its wants. The scarcity of the medium of exchange can only temporarily embarrass exchanges. Business men are most anxious to know how long the depression is to last, but it is impossible to say. It has been stated heretofore that mere legislative remedies will not avail; that we are passing through a transition, developing out of one condition into another. New rules and new measurements must be adopted. The average law-maker does not see this; he is content to juggle with the old tools, and rely upon the same class of measures and remedies to solve the difficulties which now beset us; but intelligence only can bring relief. It would not be safe, even now, to present the bald facts of the problem confronting us to the people at large; it is a question of education and patience. Prejudice and opposing opinions obstruct action, and make it dangerous, if not impossible, to apply ultimate remedies. No political party sees the issue as it is, and political leaders, if they do see it, dare not say so. The business men of the country are weary of uncertainty, and fear even worse conditions. They are both right and wrong. Necessity will force the adoption of right measures at last. So far, the volume of indebtedness in business circles has declined. This is an encouraging feature. In this respect, the present depression is different from all that preceded it. Production has been wisely restricted to market requirements. This is another important matter. In previous depressions, accumulated stock has caused bankruptcy; now work is stopped when orders are filled. Prices decline to almost cost limit, but do not run below. The reason for this is that production was never so well controlled; its organization in this country is far better than abroad. The cost of transportation has also declined during the year, and, if railway authorities are to be trusted, a further decline is probable on all kinds of freight. Within the past month, a decline in cost of several kinds of raw material has taken place, and buyers believe that this decline has not yet reached its limit. Finished products are low in price, but stationary. In a general way, it can be said with safety that there will be very little fluctuation in prices between now and spring. Whatever fluctuations do take place will probably be in a few kinds of raw material — possibly in those which an early revision of the tariff will cheapen. The industrial situation is better than it appears to be on the surface. In the first place, production has been restricted, and there are very light stocks on hand. Retailers and consumers are buying from hand-to-mouth. Capital has been restrained in enterprise, and this holding off — this checking process — has done a great deal of good. Merchants are looking forward to September for a revival of trade, but they are anticipating a little too much and too soon. The revival will come, but later and slowly. The failures show that only weak traders and producers are being driven out of the way. This clearing-out will result in great advantage to the older and stronger concerns. By next spring our industries will be in better condition; competition will be reduced, and margins will, of necessity, widen. Going into details, we find a further reduction in iron and steel making. The steel-makers have made the mistake of supplying double the necessary capacity; the textile manufacturers have been wiser. The capacity for manufacturing building-material is very little beyond actual wants; in fact, a little improvement in building activity would soon call the whole capacity into play. Throughout the South a good feeling prevails, because of the increasing markets for the staple products of the section. Their cotton goods are wanted to the extent of the present production, and new mills are projected. The decentralization of industries in the South is remarkable, and the results encouraging. Capital is finding employment in small shops, in mines of limited capacity, and in a multitude of directions individuals with small means are finding opportunities for earning a competence. Throughout the West a depression exists, largely due to the sudden suspension in mining. Large numbers of men are idle, and the disemployment is likely to continue indefinitely. Better conditions prevail throughout the Lake region and the far Northwest. A restriction of twenty-five per cent in crops is estimated, but this deficit will be partially counterbalanced, at least, by higher prices.

S. J. Parkhill & Co., Printers, Boston, U. S. A.



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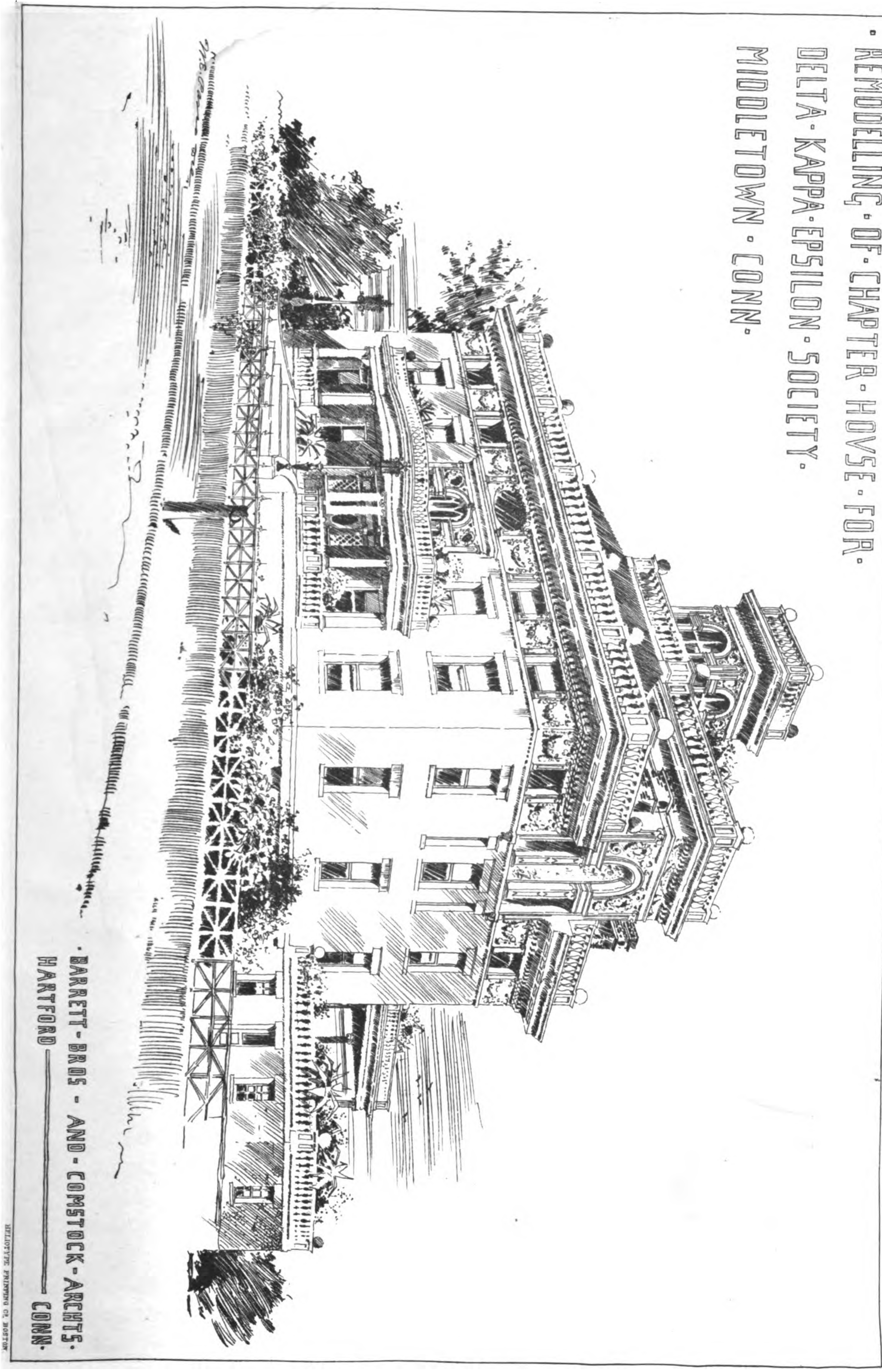

· REMODELLING · OF · CHAPTER · HOUSE · FOR ·
DELTA · KAPPA · EPSILON · SOCIETY ·
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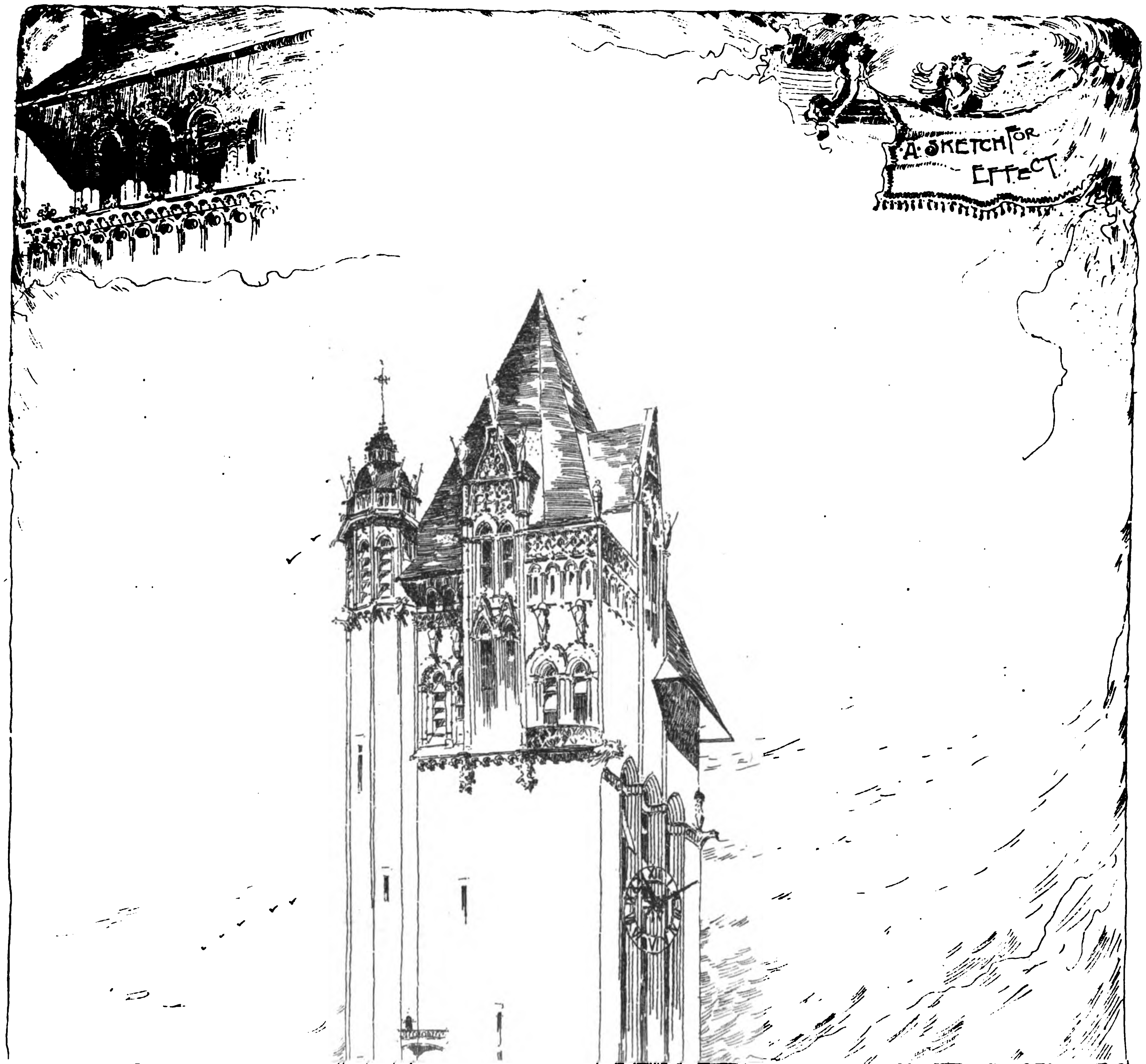

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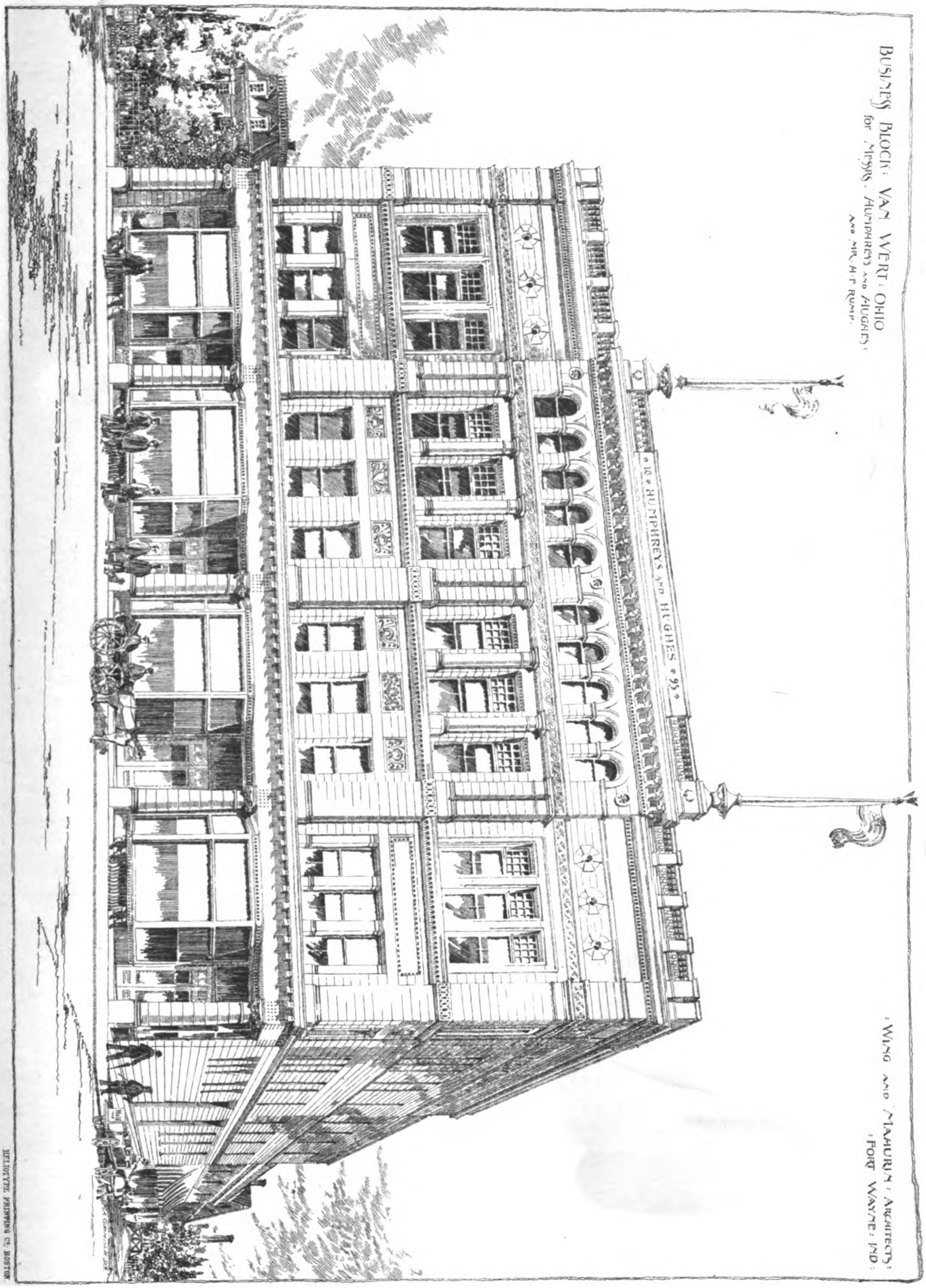
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AUGUST 5, 1893.

CONTENTS

THE Convention of the American Institute of Architects opened on Monday, at Chicago, with an attendance somewhat larger than usual, but hardly what it should be on such an occasion. The Treasurer's report showed a balance on hand of some $2,300, which is certainly gratifying, as nothing adds more to the dignity and influence of a professional body than a substantial cash surplus. Instead of the usual series of Chapter reports, which the audience is apt to find tedious, an abstract, prepared by the Secretary, was read, giving the most interesting points of each, and considerable time was thus gained for other business. This year, as usual, there was no report from the Committee on Foreign Correspondence. As the chairman of the Committee, Mr. Hunt, had just arrived from his trip to England, to receive the Queen's Medal, there was a certain excuse for the failure to present a report, but it seems to us that the duty of keeping up a correspondence between the Institute and the other great professional bodies of the world is a very important one, and that, if nothing more, the annual salutations of the Institute should be transmitted to the incorporated representatives of the profession in other parts of the world, and their replies, which are sure to be courteous and interesting, duly reported. The committee on Uniform Contracts, probably in consultation with the similar committee of the Master Builders' Association, reported in favor of omitting the ordinary clause in contracts fixing the time of completion and assigning a penalty for non-fulfilment, leaving the whole clause blank, to be filled in by individual architects at their discretion. We fear that this change will not recommend the Uniform Contract to the profession. Nothing is more disagreeable than to have to fill such blanks, and the omission of any stipulation of the kind from the printed form is sure to give the more unreasonable sort of builder the idea that he ought not to be subjected to any, and to become the excuse for wrangling and delay. The report of the Committee on Education was, as usual, conspicuous by its absence. We wonder whether any member of the Institute remembers such a thing as a report from the Committee on Education. Our experience of Conventions is a tolerably extended one, but we can recollect only very dimly the fact of their having been one or two, while the substance of the reports has left no impression whatever on our mind. The other reports resembled, as usual, that of the Committee on Education, except that a suggestion was made by the Committee on Schedule of Charges in regard to fees for alterations and additions. There is a somewhat threadbare quotation to the effect that a country is happy which has no history. Applying this principle to professional bodies, the state of the Institute of Architects, to judge from the ordinary Convention proceedings, must be felicity indeed. However, we can console ourselves with the reflection that probably the principal use of Conventions, after all, is to bring architects together, and show them how amiable in disposition they all are, and in this respect the Chicago Conventions have at least, not been less successful than others.

IT was a foregone conclusion that to the many marks of deserved applause Mr. D. H. Burnham has won in the last two years would be added his election to the presidential chair of the American Institute of Architects. This election, admirably and wholly deserved, may be of some little use to him at the moment, as an indication to the public and judicial authorities that his professional brethren do not entirely agree with the coroner's jury in the matter of his responsibility for the cold-storage warehouse disaster.

THE other new officials of the Institute are: George B. Post, New York, *First Vice-president;* Levi T. Scofield, Cleveland, *Second Vice-president;* Alfred Stone, Providence, *Secretary;* S. A. Treat, Chicago, *Treasurer;* E. H. Kendall, New York, Cass Gilbert, St. Paul, Thomas Hastings, New York, A. Page Brown, San Francisco, C. F. Schweinfurth, Cleveland, Robert Stead, Washington, G. A. Frederick, Baltimore, and Jeremiah O'Rourke, Washington, *Directors for Three Years.*

A DISPUTE has arisen in New York on the important point whether electric wire-men, when they wish to run a wire through a brick wall, shall cut a hole for themselves, or send for a bricklayer to do it for them, and, until the question is settled, work on the new wing of the beautiful Mutual Life Insurance building has ceased. The building, which is to be fourteen stories high, has been carried up ten stories, and the electric-wiring is going on in it. So far, the wire-men have cut holes for themselves, eight men being constantly employed in the building for that purpose. It seems, however, that some bricklayers, who were out of work, saw them, or heard of them, and appealed to their union to get the wire-men turned out, and themselves put in. A deputation of bricklayers accordingly waited upon the superintendent of the building, and demanded that the work of cutting holes in the walls should be given to them. They informed the superintendent that, if this modest request was not complied with, all the bricklayers in the building would strike. While the superintendent was considering the matter, the walking-delegate of the Electric Wire-men's Union appeared on the scene, and gave notice that if bricklayers were employed to do the cutting, all the wire-men in the building would strike. As the building could not go on without both kinds of workmen, the superintendent concluded to do nothing, but let the two unions settle the dispute for themselves; and the bricklayers in the building, forty-eight in number, accordingly dropped their tools and departed. What action the Mutual Life Company, which is carrying on its work on its own account, will take is uncertain, but it is unlikely that the cool and clear-headed management of that great corporation will submit to dictation from walking-delegates. Unlike a contractor, who is tied by his contract as to the time of completing his building, an owner can wait, if he wishes, rather than be imposed upon, and, in this particular case, it is quite probable that prices of materials and labor may be enough lower in a few weeks to repay the loss of rent and interest incident to the delay. As an abstract matter, the question whether a bricklayer, who sees somebody doing work which he would like to do, has a right to conspire with the members of his union to get the other man's work away from him, is of some interest, and we hope that the Electric Wire-men's Union, if the bricklayers succeed in their plans, will bring the case before the courts.

AN extraordinary military spectacle is at present to be observed in Kansas. It seems that the miners employed in the region bordering on Missouri, being dissatisfied with some of the circumstances of their condition, struck. The owners of the mines, after waiting some time for the strikers to come to terms, engaged other men. As there is nothing like police protection in the wild mining region, the

mine-owners, fearing that their new men would be assaulted, built stockades around the openings of the mines, within which they promised to shelter the newcomers. The strikers then gathered in great numbers, under arms, and threatened to march upon the stockades, and the mine-owners, fearing a general massacre, called upon the Governor for State troops for protection. The Governor, who is a Populist, seemed to be in doubt as to what attitude he should assume toward citizens bent merely upon exterminating a few "capitalists" and their "hirelings," and discreetly turned the matter over to his chief military subordinate. The latter, who is also a Populist, being under the direct order of his commander-in-chief, could not dodge his duty, and summoned a force of militia, accompanying his call with a disquisition which reads much more like one of the harangues of Jack Cade at the head of his brutish rabble than a general order from the commander of civilized troops. After explaining, at considerable length, that the controversy which was expected at any moment to express itself in a massacre was "a distinction without a difference," an observation which must have been gratifying to the poor men who were working with rifles levelled at them, he went on, after some disparaging remarks about capitalists in general, to assert that "free men" had "an inborn right to employment," accompanying this information with a hint that people who made things disagreeable for "capitalists" who did not furnish them with employment would have his sympathy, if not his active support.

A MORE mischievous act than the promulgation of this anarchistic diatribe as a general order from the commander of a State military force it would be hard to conceive. To say nothing of the fact that an officer who makes speeches on any subject is a man very much out of place, the commander of troops sent to prevent a quarrel from becoming a fight is the last person in the world who should begin his efforts by applauding and cheering on one of the combatants. As to the merits of the case, while it appears to be hopeless to look for any sense of logic or probability among anarchists, the ordinary mind will wonder why, if allfree men have an inborn right to employment, the people who were willing to work in the mines, and were trying to do so, had not just as much right as those who refused to work, and preferred, instead, to prowl around, trying to shoot those more industrious than themselves. Even the distinguished Major-General would probably admit that it was not the duty of the mine-owners to hire more men than their mines would hold, and that the surplus men should hunt up capitalists who had not hired their full complement, in preference to shooting those who had, or killing off the "brethren" already at work, in order to get their job; but it usually turns out in anarchists' proclamations, that the "free men," who have "an inborn right to employment," consists of a small number of the orator's friends or constituents, and the rest of the world ought not to object to the assassination, robbery, persecution and violence requisite for providing these favored persons with just the employment they like, and on terms satisfactory to them.

IT will puzzle some people to guess in what country the lighthouse of Eckmühl, which will have by far the most powerful light in the world, is to be built, and they will probably not get much assistance in their guesses from being told that it is to be erected on the promontory of Penmarch. Penmarch, however, is the extreme point of Cape Finisterre, which is the western termination of Brittany; and the very German name given to the lighthouse is derived from the title of the lady to whose munificence its erection is due, — Adelaide-Louise Davout d'Eckmühl, daughter of the great Marshal Davout, or Davoust, who was created Prince of Eckmühl by Napoleon, after winning a battle in the Bavarian town of that name.

THE Princess of Eckmühl, afterwards, by marriage, Marquise de Blocqueville, died a year or so ago, at a great age, leaving by will three hundred thousand francs, for the purpose of carrying out her "first and dearest wish, that there should be erected a lighthouse on some dangerous point of the coast of France, not undermined by the sea." The will goes on to say that the testatrix, having often been told that some portions of the Breton coast remained obscure and dangerous, desired to have the lighthouse built in that region, but on a solid ledge of granite, so that it might remain for a long time to recall the "noble name" of its founder, and to save from the tempest lives to offset the bereavements of war. The care of carrying out the object intended by the testator, with the help of competent assistants, was entrusted by the will to M. Le Myre de Villers, formerly Governor of Cochin China, and at this moment, we believe, one of the most important representatives of the French Government in the East. Shortly after the death of Madame de Blocqueville, M. Le Myre de Villers had a conference with the Minister of Public Works, M. Viette, the result of which was that the point of Penmarch was assigned for the new lighthouse, and it was agreed that it should be made the most important in the world, having an electric light of forty million candles, or nearly double the power of the electric light of La Heve, which is much the largest at present existing. As the bequest would not be sufficient, generous as it was, to pay the whole cost of such a lighthouse, it was agreed that the construction should be assumed by the Government, and that the three hundred thousand francs given by the princess should be first expended, the Government paying the remainder of the cost, but carrying out the work according to the wishes of the testatrix, who directed among other things, that a bronze statue of Marshal Davoust, belonging to her, should be set up in the lower hall of the lighthouse, and that on its pedestal should be carved the names of the battles in which he had been engaged. The work is now in progress.

OUR German exchanges advertise something which seems to us to be worth the attention of architects and designers here, in the shape of direct-indirect radiators, formed, not of vertical tubes or castings, as is usual with us, but of horizontal coils. The idea is not new. We have ourselves employed the same arrangement, and have seen it used by others, but the fact that a manufacturing house finds it worth while to make and send out such coils in large quantities suggests the probability that, with a little study, coil radiators might be made with castings put together with bolts as vertical radiators now are, which would heat better, particularly for direct-indirect systems, and be more ornamental. It must be confessed that, so far, no beautiful objects in the shape of vertical radiators have made their appearance in the market. We do not say that they cannot be made, on the contrary, it is possible that a delicate colonnade design might be successfully adapted to such radiators; but the surface-ornamentation hitherto employed has only increased the desire of architects to conceal appliances of the sort as much as possible. With coils, it seems to us that much more might be done. In the German examples, the coil is a flattened spiral, the fresh air introduced from out of doors being brought up through the middle. This is a good shape for circulation, as well as for heating. It is well known that horizontal coils heat much more air, for a given surface, than vertical tubes, and it would be easy, in a cast radiator on this system, to arm the hollow interior of the coils with pins, which must increase their efficiency.

OUR readers will remember the curious observations of Professor Henrici on the way in which streets and squares should be planned to avoid a tiresome effect, and it is interesting to find that the same writer has been awarded a first prize in the competition for designs for the enlargement of the city of Munich. The *Deutsche Bauzeitung* of July 15, publishes his plan, which is worthy of close study. It is hardly necessary to say that he has followed in it his own principles of street-planning, but with a variety of picturesque effects which will charm artists and architects a good deal more than they will the city surveyors. Out of the hundreds of streets on the plan, only a few are straight, but the curvature of the others is generally extremely gentle, while the width of nearly all the streets, even of the straight ones, varies in different portions. The rule, where enlargements of the street are made, of making them on one side only, is adhered to except in a few instances, but in all these a building is planned in the axis of the space, or two buildings are so arranged in it as to lead the eye between them in lines continuing the street lines. We have before observed that, in laying out new suburbs in Germany, no attention whatever is paid to property-lines, and Professor Henrici's plan not only ignores private boundaries but discontinues and changes existing streets in a way which, in this country, would give rise to endless lawsuits. His plan includes also a *ringbahn*, or metropolitan railway, connecting all the railways entering the city, which looks as if it had been designed without consulting the directors of the present roads.

PORTALS.[1]—II.

THE first half (1226–1248) of the reign of St. Louis marks the zenith of the mediæval portal. The triple portal of Notre-Dame, at Amiens (Fig. 6), and that of Notre-Dame of Rheims (of a much later date, but executed after designs made in the middle of the thirteenth century) are two of the most imposing in this style [See "*Cathédrale*," Figs. 37, 44]; more imposing still, if possible, is the quintuple portal of the Cathedral of Bourges, notwithstanding the restoration which it underwent in the fifteenth and sixteenth centuries (Fig. 7).

The portal suffered sooner and more disastrously than any other part of the church from that abuse of logic and refinement which precipitated the decadence of Gothic architecture. In jambs with simple columns, the latter, which, until this

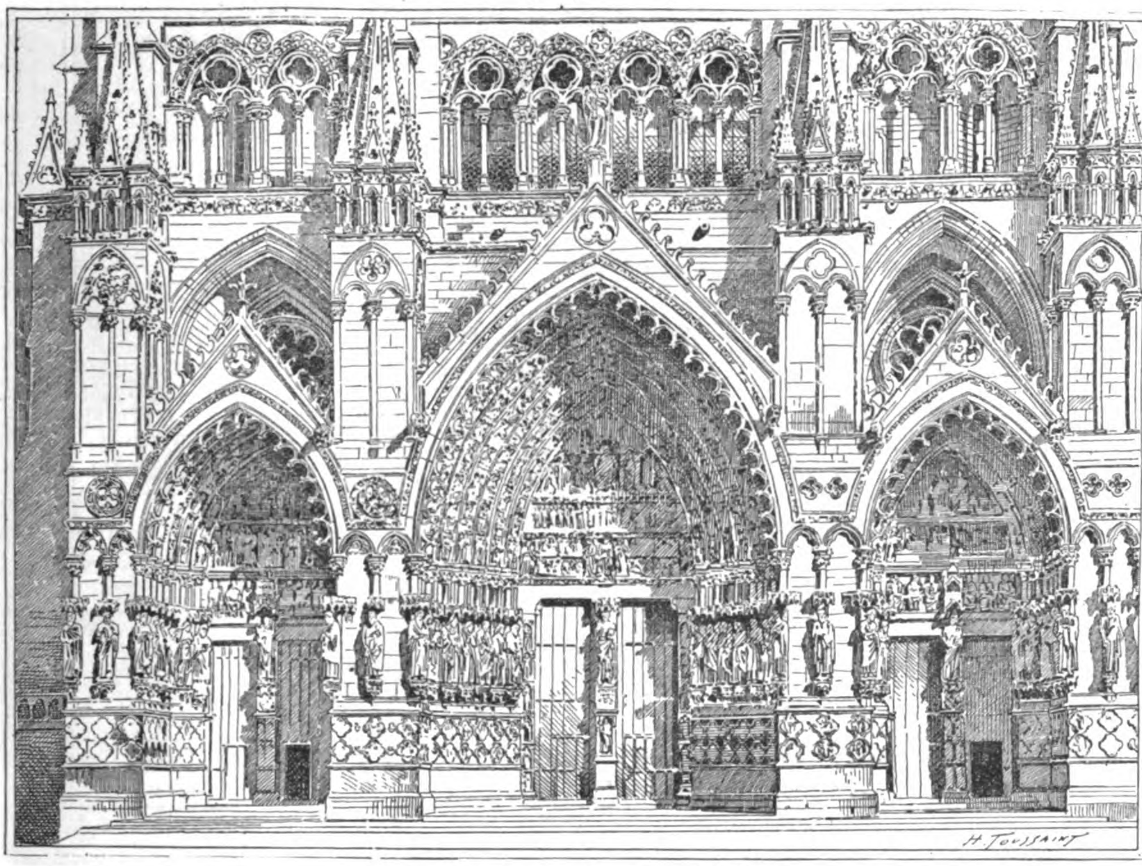

Fig. 6. Triple Portal of Notre Dame of Amiens.

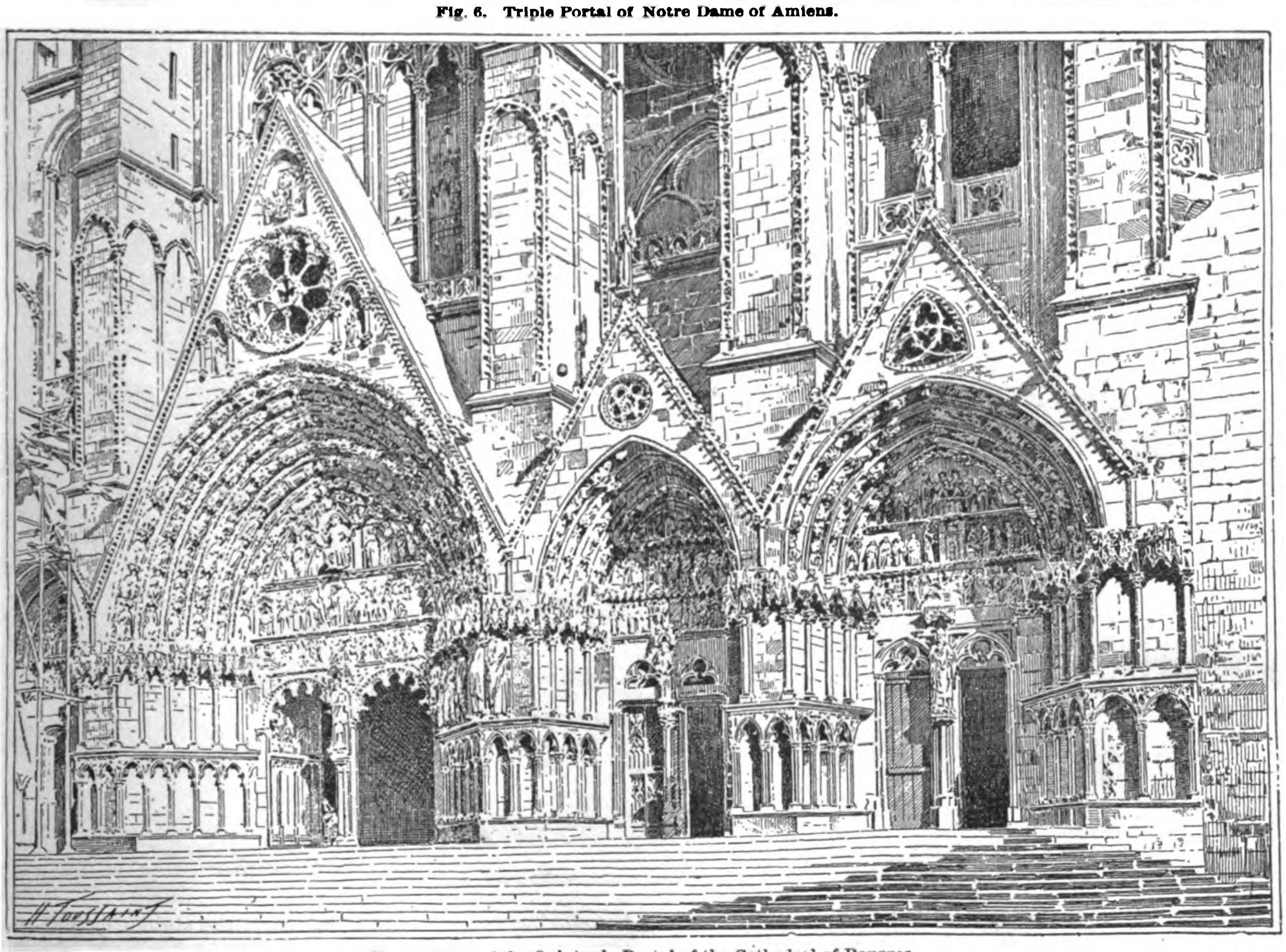

Fig. 7. Part of the Quintuple Portal of the Cathedral of Bourges.

[1] From the French of A. Saint-Paul and H. Nodet, in Planat's *Encyclopédie de l'Architectu reet de la Construction.* Continued from No. 918, page 64.

time, had been nearly always distinct and disengaged from the masonry, became so far a part of it as to be nothing more than vertical ribs or mouldings continuing the tori — themselves altered — of the archivolts (Fig. 8). The archivolt, in its

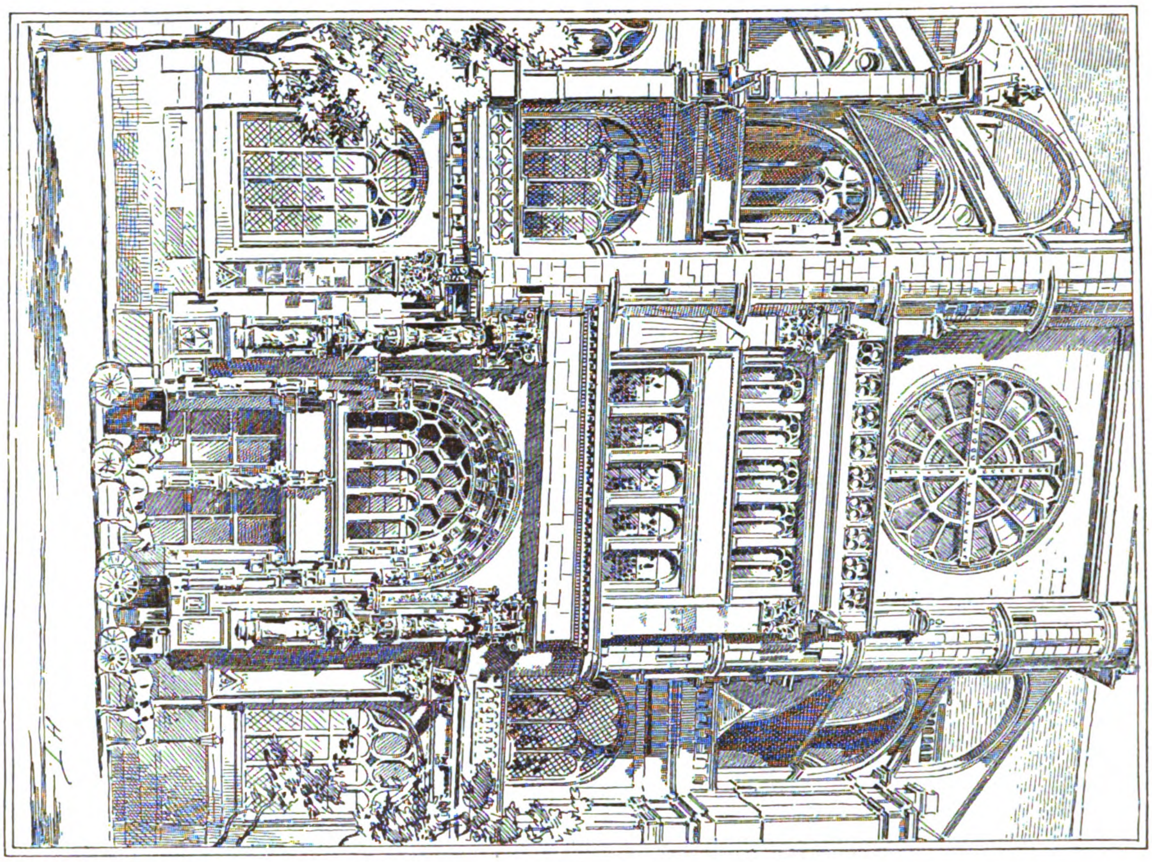

Fig. 8. South Portal of Saint-Eustache, Paris.

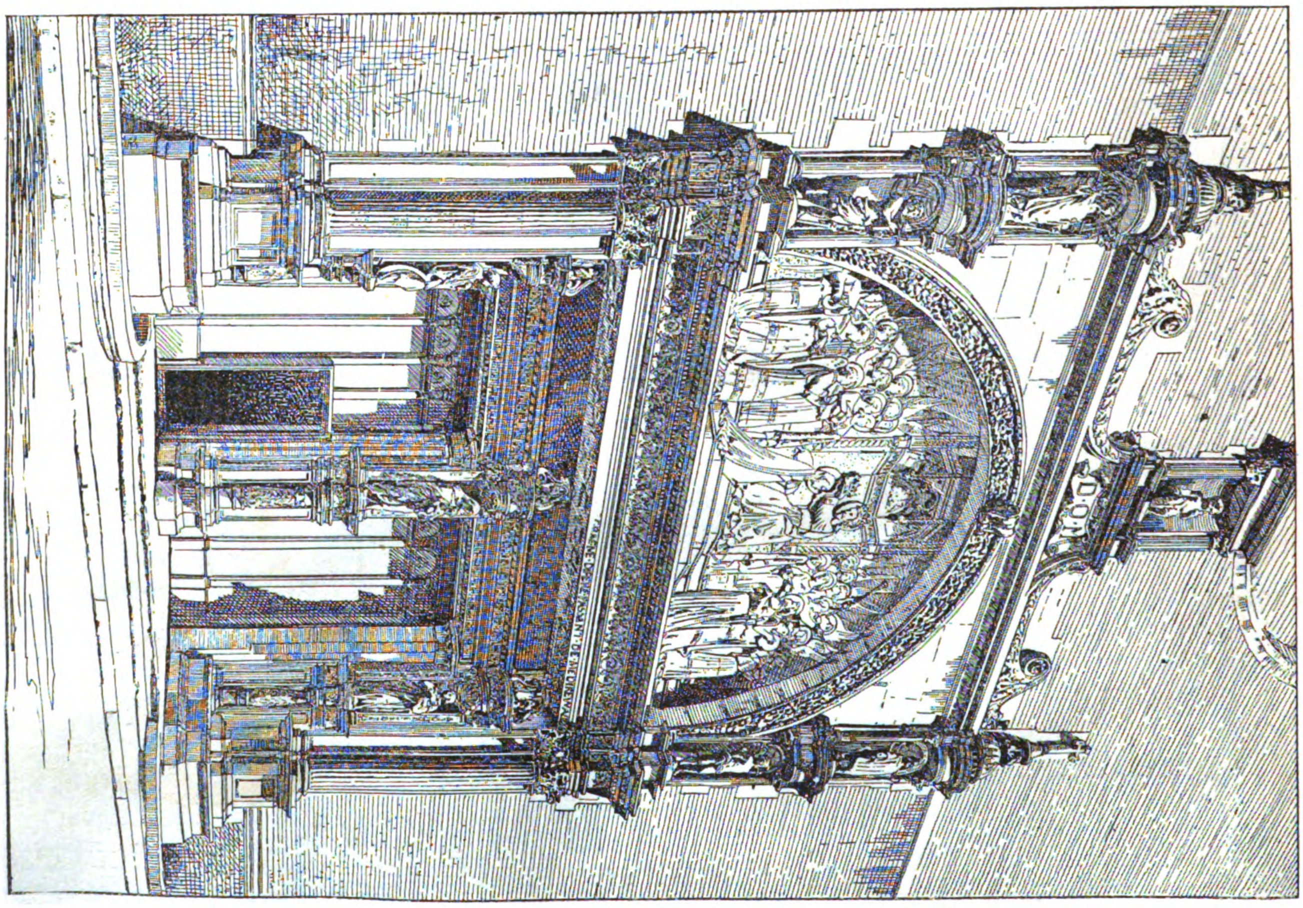

Fig. 9. Portal of Notre Dame de la Dalbade, Toulouse.

turn, lost the life and variety which had so happily distinguished it in the Romanesque period; it was now a monotonous repetition of uniform panels with a deplorable poverty of profiles. In embrasures with statues, the latter were placed between the panel-frames, isolated from one another beneath their great canopies, which were at first an expansion of the capitals, but afterwards replaced them; the statuettes of the covings were also covered with canopies, which likewise separated them from one another; when the old columns had become incorporated in the masonry, the statuettes and statues stood out from it, so that they had the appearance of movable objects that could be fixed anywhere at will by means of iron cramps. Therefore, as we approach the sixteenth century, we discover less unity in the subjects, and often in the proportions

of the different sculptures. As for the tympanum, we grow accustomed to considering it simply as a window skeleton — and this skeleton was sometimes not merely indicated, but was actually pierced — so that in the late Gothic period and in the Renaissance (Fig. 8), by an excessive elongation of the tympanum, the point was reached of making a genuine window between the covings and the lintel; this was especially the case in Champagne and Touraine.

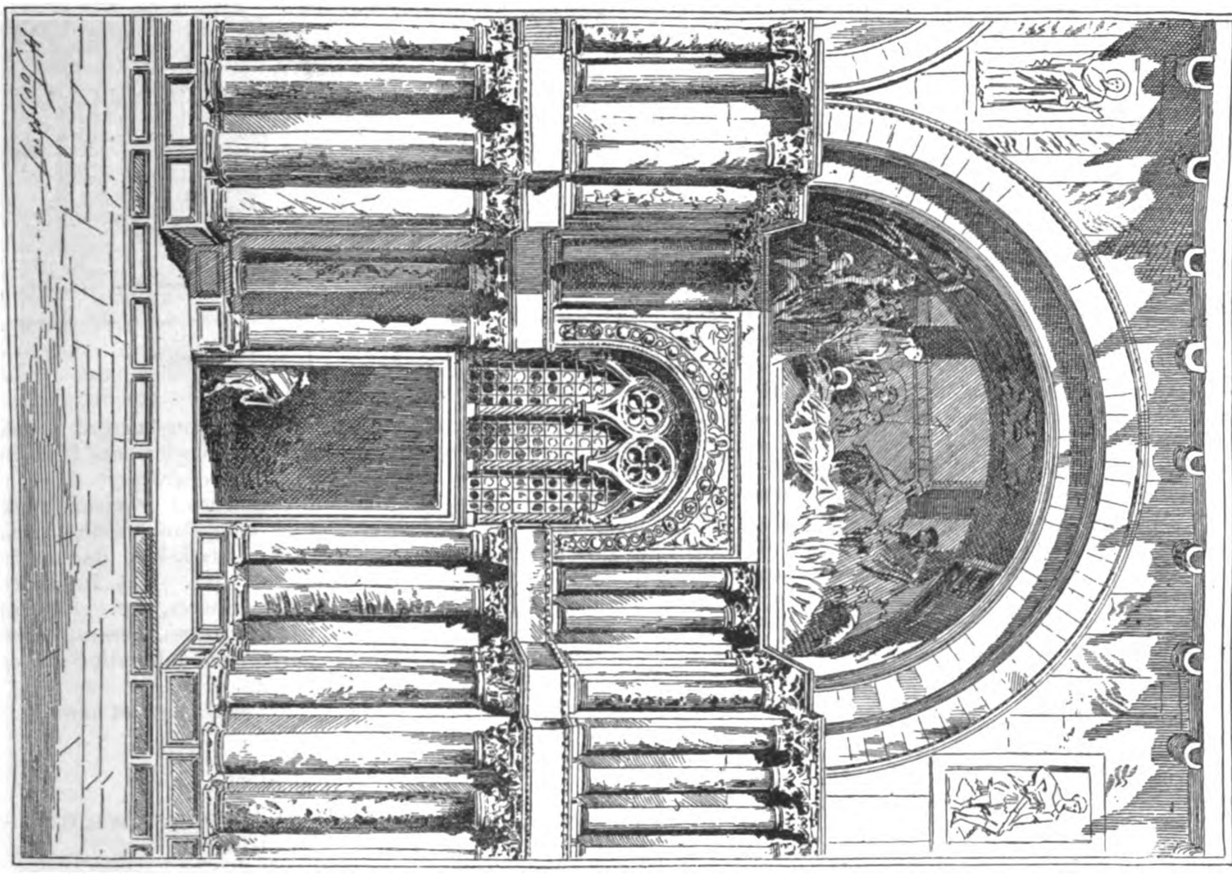

Fig. 10. Portal of St. Mark's at Venice.

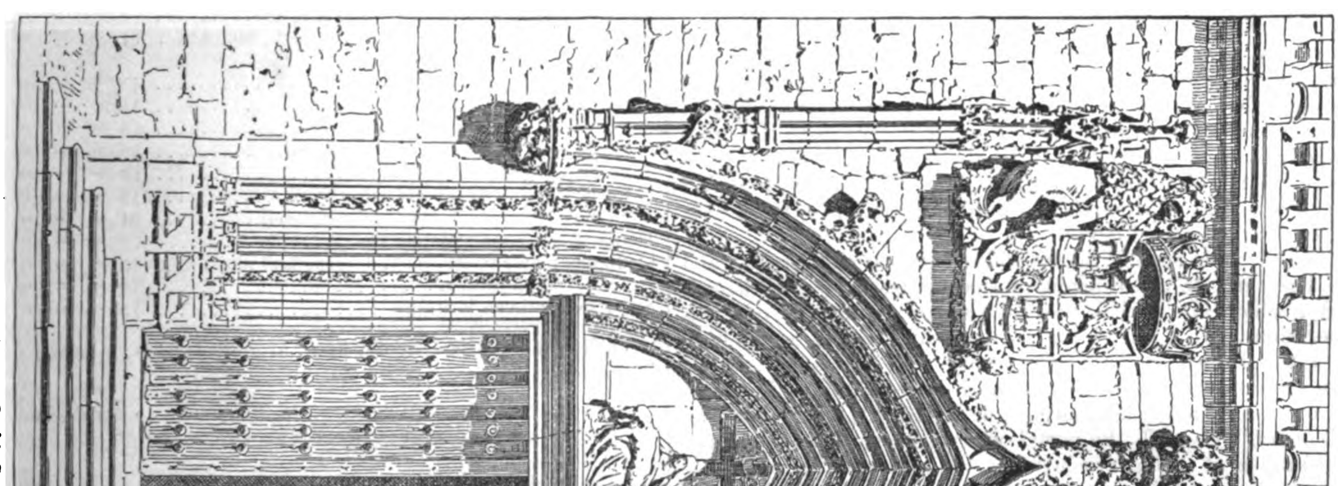

Fig. 11. Gothic Portal at Burgos.

What the embrasures lost in wealth and harmony the gable was not slow in gaining. At Rheims, it received the images that should have figured in the tympanum. Its angle was made so extremely acute that it seemed like a monumental structure over the door; it was flanked by pinnacles, and the surroundings of the entrance vied with the door itself in attracting the attention of the observer. But decadence began to appear in these accessories also, and the demand for elaborate contours, which characterizes the second half of the fifteenth century, did not spare this disposition; the gables were

traced with double curves, involving the outer archivolts, and the whole terminated in a bouquet, often of extraordinary size.

The Renaissance brought about some little balance between the portal and its accessories. The dispositions were at first apparently the same, the changes being effected in the details, the style of which was more and more inspired from antiquity (Fig. 8). The semicircle resumed its place in the archivolts; these were ornamented in divers ways, as during the Romanesque era (Figs. 8, 9). Later on, a Classic order, with friezes and medallions, superseded the gables and pinnacles; but, under the growing influence of Greco-Roman forms, the embrasure was reduced to a single archivolt, with or without a statue, and the tendency was toward making it nothing more than an ordinary arch; the rectangular bay, with casings and pediments, reappeared and won the day; and, from the reign of Henri IV, the portal had really ceased to exist for architects.

The foreign schools were always much inferior to those of France in the composition of portals. In Italy, during the Romanesque period, their decoration was almost wholly confined to the exterior; there was a tympanum, but the frame itself of the rectangular bay assumed an importance equalling or surpassing that of the arch [See "Italian Architecture," *American Architect* for November 14, 1891, *et seq.;* and "Lombard Architecture," *American Architect* for September 10, 1892, *et seq.*]. We call attention to the very peculiar portal of St. Mark's at Venice (Fig. 10). If we find, as at Sienna and Orvieto, that from the thirteenth to the fifteenth century the covings increased in number, we must remember that it was due to a more or less direct French influence.

In Spain, so long as the influence of France was felt, the portals had very deep embrasures, with very dissimilar proportions, and, from the fourteenth century, with very complicated dispositions of detail. In the middle of the fifteenth century the frame predominated, especially over the arch, where it doubled and even tripled the height (Fig. 11). [See also "Spanish Architecture," Fig. 39, *American Architect* for June 27, 1891.]

In England, the Romanesque doorways resemble those of Normandy; wherever a local type was formed in the thirteenth century it lacked in spaciousness; while everything else was expanding, the portal itself was shrinking. The English, possessing but little skill in statuary and bas-reliefs, avoided that ampleness which would render their poverty in this respect too apparent, and the main entrances to the great cathedrals seem weighed down by the immense windows above them [See "*Cathédrale*," Fig. 60, and "*Gothique Anglais*," Fig. 13]. In the fifteenth and sixteenth centuries, the arches were often depressed ogives.

The German type is intermediate between the English and the French. In the Romanesque period we have the Rhenish style, which approaches the Burgundian, although it is less sumptuous. In the Pointed period, which really begins only with the French decadence, statuary was introduced; but it was subject to a formal architectural disposition, and in places remote from French influence, as at Ratisbon [See "*Gothique, Allemand*," Fig. 6], the portal was very small, and had the appearance of being crushed by the surrounding mass and ornaments; yet this was not as pronounced as in England.

The mediæval portal, in spite of its frequent imperfections, has remained inimitable for contemporary architects. To reproduce it with all its advantages, a workmanship is demanded which is to-day very costly; therefore, both the Romanesque and Gothic portals of modern works are deplorably stiff and dry.

A. SAINT-PAUL and H. NODET.

SLAG AS A SOURCE OF AGRICULTURAL PHOSPHATES.—Jacob Reese, a well-known inventor of this city, who first discovered that the slag from basic-steel converters could be made into an excellent phosphate, large quantities of which are sent from this city to Germany, tells a curious story of the way in which he made the discovery. He was one day near the stables of a large steel-making establishment, when one of the employés called his attention to some corn that had grown from feed dropped among the slag. "Did you ever see such big corn, Mr. Reese?" asked the man. The inventor looked at the corn, then at the slag, and the connection between them flashed upon him at once. He made a few experiments, and from this simple beginning started what promises to become an important industry. A single contract calls for the export of 100,000 tons of the new phosphate from this city to Germany.—*Philadelphia Record.*

OFFICE-HELP FOR ARCHITECTS.[1]—XV.

Gateway to a Bohemian Farmhouse. From *Architektonische Rundschau.*

CHAPTER VI.—TRUSSES.

SECTION I.—GENERAL:

§ 233. Materials: — Usually wood, wrought-iron, or steel. Mild steel is the best for all purposes except where both wood and labor are very cheap and steel very dear.

§ 234. Loads: — In the design of trusses provision must be made for: (*a*) Static-load due to weight of trusses, purlins, rafters and roof covering. (*b*) Any static-load due to floor, dead-loads, ceilings, seats and the like. (*c*) Intermittent uniform loads due to people, snow, stores, etc. (*d*) Intermittent unsymmetrical loads, wind-pressures, eccentricities of loading, etc. These loads for purposes of tabulation and computation are divided into three classes.

(*a*) All static-loads and the horizontal effect of snow.
(*b*) All loads due to wind-pressure.
(*c*) All other loads.

TABLE XX.

VARIOUS STATIC-LOADS ON TRUSSES, WEIGHT OF TRUSS INCLUDED.

Roof of corrugated iron, moderate spans.........	8 lbs. per sq. ft.
" " " " " " boarded..	11 " " " "
" " " " " " " and plastered..........................	18 " " " "
" " slate on lath..........................	13 " " " "
" " " " boards..........................	15 " " " "
" " " " " and plastered...........	23 " " " "
" " shingle on lath..........................	10 " " " "
" " " " boards.....	13 " " " "
" " " " " and plastered..........	21 " " " "
Roofs of tin, copper or canvas..................	12 " " " "
Ordinary frame floors, joist, flooring and plastering.	16 " " " "
" skylights.............................	12 " " " "
Snow in northern latitudes......................	15 " " " "

Ordinary fireproof floors, floor arches, boards, plaster, etc., hereafter given.

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[1] By George Hill, Consulting Engineer. Continued from No. 914, page 8.

ABBREVIATIONS AND SYMBOLS.

= equal to.	∴ therefore.
‖ parallel to.	□′ square feet.
÷ divided by.	□″ square inches.
× multiplied by.	8* read 8 pounds per lineal foot.
+ added to.	[channel bar.
a^2 a multiplied by itself.	I I-beam.
$a > b$: — a greater than b.	T T-iron.
$a < b$: — a less than b.	L angle iron.
$\frac{a}{b}$: — a divided by b.	⊥ deck beam.
	● round section.

I ton = 2,000 pounds as this is the conventional ton, the legal ton is 2,240 pounds, but is rarely used.
l = the length between supports of any beam or girder or height of any column, always in feet.
b = breadth of any beam or girder, always in inches.
d = depth of any beam or girder, or the least transverse dimension of any column, always in inches.
L = total load uniformly distributed coming on any piece in pounds.
$L^{□′}$ = " " " " per square foot in pounds.
W = concentrated load on any piece in pounds.
s = span of any arch or truss between centres of end pins in feet, or spread of footing courses.
A = area of any section in square inches.
M = maximum bending-moment in inch pounds.
n = distance of centre of gravity of section from either top or bottom edge in inches.
I = moment of inertia, neutral axis through centre of gravity.
R = moment of resistance of section.
r = radius of gyration, in inches.
Sc = safe compressive strain in pounds per square inch.
St = " tensile " " " " " "
Ss = " shearing " " " " " "
S = strain per square inch in extreme fibre.
P_e = upward reaction of support at left-hand end of beam.
P_f = " " " " " right " " " "
e = distance of centre of gravity of load from left hand of beam.
f = " " " " " " " " right " " "

TABLE XXI.

NORMAL EFFECT OF WIND-PRESSURE ON ROOFS WHEN THE PRESSURE ON A VERTICAL SURFACE EQUALS 40 POUNDS PER SQUARE FOOT.

Roof angle.	Pitch per ft.	Wind-pressure.	Roof angle.	Pitch per ft.	Wind-pressure.
5 degrees.	1″	5.2	35 degrees.	$8\frac{1}{2}$″	30.1
10 "	$2\frac{1}{8}$″	9.6	40 "	10″	33.4
15 "	$3\frac{1}{4}$″	14.0	45 "	12″	36.1
20 "	$4\frac{3}{8}$″	18.3	50 "	$14\frac{3}{8}$″	38.1
25 "	$5\frac{1}{2}$″	22.5	55 "	$17\frac{1}{8}$″	39.6
30 "	$6\frac{7}{8}$″	26.5	60 "	$20\frac{3}{4}$″	40.0

The normal effect of the wind may be readily found as in § 194, as described for the method for framed ribs.

§ 235. Computations: — Write out all assumptions as to loading. Lay out a complete diagram of the truss in skeleton, scaling it as exactly as possible. Locate the fixed side of the truss on the side most easily braced against the wind-thrust. Letter the truss. Draw arrows representing the loads and write on them the amount of the load. Then draw first the static-load diagram, then the wind-left diagram and finally the wind-right diagram. Each diagram must be carefully drawn with a fine pencil with the intersection of all lines made as sharp as possible and following the lines of the truss exactly.

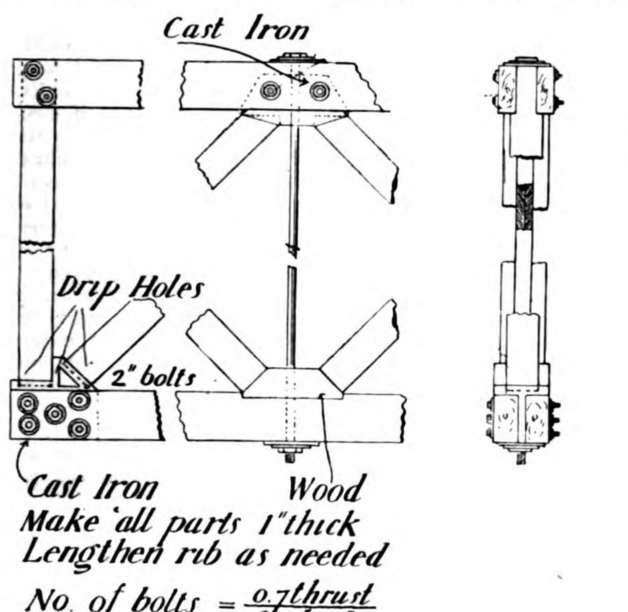


Fig. 61.

As fast as the lines are drawn the signs + for compression and — for tension must be drawn. The lettering of the diagrams must be done carefully also to avoid confusion. Then prepare a table with headings as follows, for the tabulation of results.

Name of piece (1)	S. L. + (2) —	W. L. + (3) —	W. R. + (4) —	Misc. + (5) —	Max. + (6)	Max. — (7)

Enter in the table under the proper headings the strains on the several pieces under their proper signs and carry out as a resultant the maximum algebraic sum of the strains on any piece as the strain that comes on the piece which must be provided for. Where there are both compression and tension at different times the connections must be made to provide for both and the piece must be made strong enough to carry that strain that will cause the greatest distortion of it. Where there is but one diagonal of a panel necessary for the analysis of a truss it should be drawn in and then one drawn in the other diagonal, but dotted. In a pin-connected truss, where the diagonals are meant to resist tension only, the diagonal which has a compressive strain on it, deflects and throws the strain to the other diagonal as tension. Having determined the strains due to the truss action, each rafter or tie must be examined for transverse strains. Should any be found that cannot be avoided conveniently, their effect must be provided for by increasing the bottom or top flanges as the case may require, to provide for the additional strain of the particular kind. That is, the top flanges of all compression-members and the bottom flanges of all tension-members must be increased. Finally every rafter or tie, except for the very lightest truss, must be proportioned to carry the weight of two men on the centre so as to make it possible to paint or repair the roof or truss without a scaffold.

Spacing: — The spacing of trusses is very difficult to determine without using successive approximations. The writer

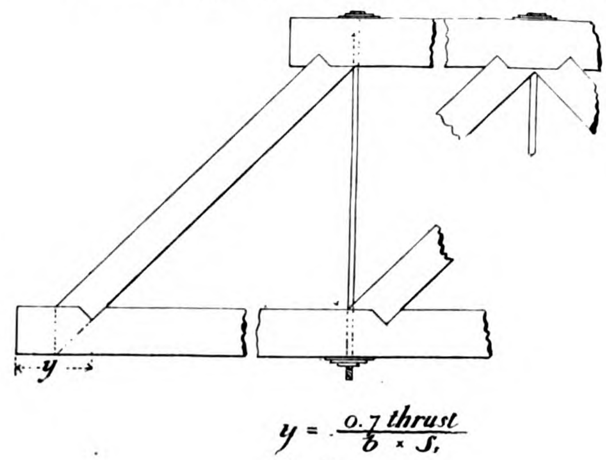


Fig. 62.

usually tries a spacing of from 12′ 0″ to 16′ 0″, *c* to *c*, of trusses and then a somewhat larger spacing, comparing the weights of both. This serves to indicate the most economical spacing to use and then a last truss is worked out for this spacing. If it does not give an advantage, another spacing should be tried so as to surely get the right distance. Generally the wider the span the wider the trusses can be spaced apart.

SECTION II. — WOODEN TRUSSES:

§ 236. Types: — Wooden trusses should be limited to simple king and queen post trusses, Howe trusses, lattice-girders, hammer-beam trusses or the trussed girders described in § 204.

§ 237. Proportioning: — Proportions should be adjusted in accordance with the principles of Chapter II and Section I of this chapter.

§ 238. Details: — The framing plans should be laid out in skeleton to a $\frac{3}{4}$″ scale and the details of the connections to a 3″ scale with every part fully dimensioned.

The diagonals will be of wood and the posts of wood with tie-rods beside them to take care of the tensile strain. (Fig. 61). The abutting parts of the wood compression-pieces must rest against a cast-iron shoe with the area so made as to reduce the strain on the fibres to 500 pounds per square inch, or against oak blocks. If the strain is very light it may be safe

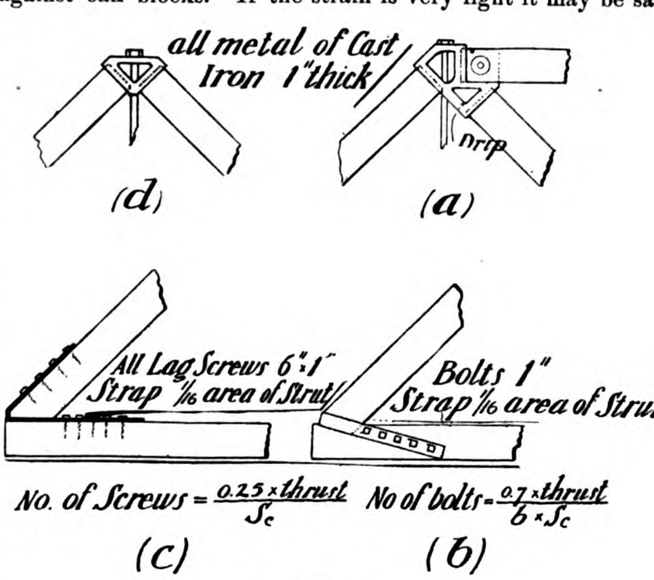


Fig. 63.

to leave off the cast-iron shoes. Where the inclined members join the end of the lower chord, the depth of the notch or area of abutting parts in a vertical plane must be proportioned to resist the pressures passed down the inclined piece, by resolving the strain into components perpendicular and parallel

to the lower chord and then allowing sufficient area to take up the strain in shear (Fig. 62).

When the shear is too great, requiring dimensions impracticable for wood, it may be provided for with iron straps or shoes (Fig. 63). At the apex of the king and queen post trusses the joint must be made with a cast-iron socket to take the thrust and distribute it over the fibres (Fig. 63).

Lattice-girders should be made with all of the connections made with oak treenails, about 1½″ diameter, well driven in but not splitting the wood (Fig. 64). The shear between the different parts should be computed on the assumption that the latticing makes a solid web, and the number of treenails determined so as to reduce the pressure on them within the limits of shear for oak, or below the S_c for the materials of the chords. All trusses of wood must be covered from the weather but with a space left around for ventilation and the inspection of every part. None of the wooden parts should be painted, but all of the iron should be painted once a year. The housing of the trusses should be perfectly waterproof and should be carefully maintained.

The floors of all structures of the nature of bridges that are subjected to wind-strains should have the flooring so arranged as to afford a bracing in the nature of a horizontal truss. All

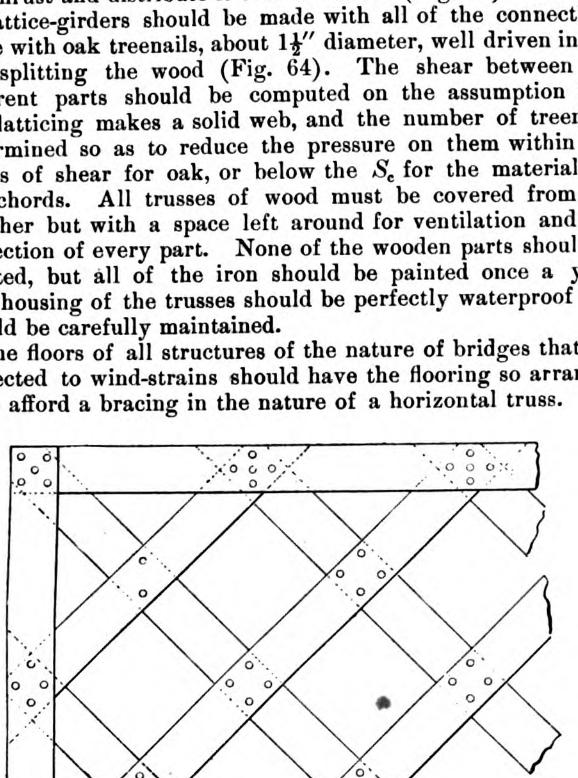


Fig. 64.

trusses should be made with regular stock and all sizes should be limited to a breadth of 4″, and if a greater width is required to fill the conditions it should be gained by building up 4″ pieces and spiking them together. Allow an additional 1″ all around for provision against the weakening effects of fire. Make all of the members of a good working size even if the strains do not require it — wood must have size to look strong enough. When hammer-beam trusses are unavoidable they should be made with plenty of wood and with the connections made with great care and thoroughly bolted together. A good way to follow is to find the strains and then compare the sizes found necessary with the sizes of a truss of the same span actually built and increase the sizes as first found to agree with the example, if necessary, but do not decrease any of the sizes first decided on as the additional size will do no harm. If the roof is to be open-timbered, it should be made of good framing pine, mill-dressed, and then left for at least two years before being touched. For other cases of wood trusses see § 204.

[To be continued.]

The Date of the Churches of Central Italy. — Prof. Frothingham of Princton College returned not long since from an extended archæological tour through Central Italy, and, according to the *College Bulletin*, one of the most interesting results of it is the proof he has adduced to the effect that many of the Christian churches, which have been supposed to date from the early centuries of our era, really belong much later; in fact, well into the Middle Ages. — *N. Y. Times.*

DESTRUCTION OF CITY REFUSE.

Capitals from the Church at Rasdorf. From *Zeitschrift für Bauwesen.*

I HAVE received at different times applications from the proper authorities of cities in the United States for particulars concerning the disposition of sewage in England, and I transmit herewith a report on that subject recently printed by William B. G. Bennett, the borough engineer and surveyor of Southampton. I have secured specifications from other cities, but, deeming the Southampton "destructor" the best in England, I waited for this report.

I desire to remark that the system of sewerage here is similar to that in American cities. The authorities have not yet adopted any systems of sewage-gas consumption, but it is their purpose to do so.

Since the introduction of this system of refuse destruction the vegetation usually seen on the shore immediately approximate to the city has disappeared or changed, and certain kinds of fish which feed upon sewage have become scarce in the adjoining waters.

Jasper P. Bradley, *U. S. Consul.*

Southampton, May 11, 1893.

SOUTHAMPTON SEWAGE-PRECIPITATION WORKS AND REFUSE DESTRUCTOR.

Early in 1885 the corporation of Southampton considered it expedient to introduce a more efficient system for the collection and disposal of house refuse; and about the same time they found it desirable also to clarify by precipitation the sewage of a particular district of the town, which was being discharged in its crude state direct into the Southampton water of the town quay. Having been instructed to devise a scheme for accomplishing these objects, the author proposed the adoption of a refuse-destructor for destroying the ash-bin contents and garbage of the town, and also that the sewage-sludge should be transmitted to the destructor from the two existing reservoirs in which it was deposited in the process of clarification. These reservoirs are each 100 feet long and sixty feet wide, and at the lowest end ten feet deep. Formerly the sewage of a district of the town, amounting to 500,000 gallons in twenty-four hours from a population of about 13,000, for the most part flowed by gravitation into these reservoirs, whence it was discharged into the tideway at low water; while a small portion, coming from a low-level sewer, passed direct into the tideway through iron pipes laid under the reservoirs. The reservoirs act alternately, one being left still for precipitation of the sewage while the other is being filled.

PNEUMATIC EJECTORS.

In order to render independent of the tide the discharge of the clarified effluent from the reservoirs, and to raise the low-level sewage into the reservoirs for treatment with the rest, two pneumatic ejectors were erected, both of which are worked by power obtained from the destructor. The smaller, of 360 gallons capacity, is placed in the east reservoir, below the invert of the low-level sewer, and serves for transmitting the sludge from the reservoirs to the destructor, as well as for raising the low-level sewage; and the larger, of 700 gallons' capacity, is placed in the east reservoir for discharging the clarified effluent into the Southampton water. There is also a third ejector, of 360 gallons' capacity, which deals with the sewage of another district of the town near the destructor works, and is likewise worked by power obtained from the destructor; with an air-pressure of twelve pounds per square inch it raises the sewage about eighteen feet from a low-level sewer to a higher one. This ejector was formerly worked by an independent steam-engine, costing for coal about £120 per annum, which is now saved since the adoption of the destructor.

The sewage gravitates from the sewers, through the inlet-pipe, into the ejector and gradually rises therein until it reaches the underside of the bell. The air at atmospheric pressure inside this bell is thus inclosed; and the sewage continuing to rise outside above the rim of the bell compresses the inclosed air sufficiently to lift the bell, the spindle of which then opens the compressed-air admission-valve. The compressed-air thus automatically admitted into the ejector presses on the surface of the sewage, driving the whole of the contents before it through the bell-mouthed opening at the bottom and through the outlet-pipe into the iron rising-main or into the high-level gravitating-sewer, as the case may be. The sewage can escape from the ejector by the outlet-pipe only, because the instant the air-pressure is admitted upon the surface of the sewage the non-return flap-valve on the inlet-pipe falls on its seat and prevents the sewage from escaping in that direction. As the sewage flows out of the ejector, its level therein falls to that of the cup; and still continuing to lower, it leaves the cup full until the weight of the stuff in the portion in the cup thus exposed and unsupported by the surrounding sewage is sufficient to pull down the bell and spindle, thereby shutting off the admission of compressed-air to the ejector. The compressed-air remaining within the ejector then exhausts through an air-escape valve in the top, which is opened by the fall of the cup and spindle; and the sewage-outlet non-return flap-valve falls on its seat, retaining the sewage in the rising-main. The sewage then flows once more

into the ejector through the inlet, driving the free air before it through the air-escape valve as the sewage rises; and so the action goes on as long as there is sewage to flow. The position of the bell-and-cup floats is so adjusted that the compressed-air is not admitted until the ejector is full of sewage, and is not allowed to exhaust until the ejector is emptied down to the discharge-level.

RESERVOIRS.

In each reservoir there is a floating sewage-inlet, consisting of a pipe hinged to the larger or effluent ejector and shackled to a buoy; the latter causes the free end of the pipe to rise and fall with the level of the liquid, keeping its mouth, which is covered with a perforated plate, a few inches below the surface of the liquid, in order to prevent the entrance of any floating solid matter. Directly the clarification by precipitation has been effected to a certain depth, a valve is opened, admitting the liquid into the larger ejector, whence it is at once discharged into the tideway. A supplementary sewage-outlet is also provided in each reservoir for discharging the liquid by gravitation when the tide is low enough. When the whole of the liquid has been thus drawn off, the buoy, resting now upon the floor of the reservoir, keeps the mouth of the inlet-pipe high enough to prevent the entrance of any sludge into the larger or effluent ejector; and by opening a valve the sludge is then admitted into the smaller or sludge ejector situated at the lower level and is transmitted by air-pressure through a line of four-inch cast-iron pipes, about a mile in length, to the destructor erected on the Chapel Wharf. An air-pressure of forty pounds per square inch is required for working the sludge-ejector and of ten pounds for the effluent-ejector.

PRECIPITATION.

Ferrozone is used for precipitating the sludge; it is mixed with just enough clean water to make the whole into a stiff paste, which is led through a shoot into a box with perforated sides placed in the sewer. The sewage flowing past washes the ferrozone gradually out of the box, and is thoroughly mixed with it by the time it discharges into the reservoirs at a man-hole 150 feet distant from the box. A small stream of water falling upon the ferrozone prevents it from consolidating. The box is filled three times in twenty-four hours, and this method of dosing the sewage has proved quite efficient and satisfactory.

MANURE-MIXING.

On arriving at the destructor the sludge is delivered into a cell, from which it is drawn as required through a valve-pipe; and after mixture with road-sweepings or sorted house-refuse it is turned out as a good manure, which from the commencement has all been readily bought up by agriculturists at 2*s*. per load delivered at the works. On an average, sixty-seven cart-loads of ash-bin contents are daily collected and disposed of, the ascertained weight of the load in each cart averaging a little under 17 cwts. The road-sweepings are never burnt; but, to keep pace with the demand, the sludge is run into bays made of the road-sweepings, and is also filled-in with them. The quantity of road-sweepings thus utilized amounts in twenty-four hours to about eight tons. Arrangements were provided at first for burning the sludge, for which purpose it was discharged into a tank on the floor of the destructor and drawn out through ports into the front, opposite the feed-openings of the firing-chambers, where its moisture was absorbed by the ash-bin contents, which were backed up against the ports with this object; and the mixture was then raked into the fires. Large quantities of sludge were thus destroyed; but the process has since been discontinued, owing to the ready sale of sludge when prepared for manure.

DESTRUCTION.

The refuse destructor has six chambers of furnaces, each capable of burning eight to eleven tons of garbage per day. The products of combustion pass through a thirty-horse-power multitubular steel boiler in the main flue into a furnace shaft, which is of circular brickwork, 160 feet in height from the ground line, six feet inside diameter at top, and seven feet at bottom. The shaft is constructed upon a pedestal fourteen and one-half feet square and twenty-four feet high, of brickwork three feet thick; and thence upward in four sections, of which the first is twenty-seven inches thick and thirty feet high, the second twenty-two-and-one-half inches thick and thirty feet high, the third eighteen inches thick and thirty-eight feet high, and the fourth fourteen inches thick and thirty-eight feet high. The first thirty feet (of this shaft) is lined with fire-brick, and behind the lining is a cavity four and one-half inches wide, which is ventilated by apertures to the outside of the shaft. The foundation is loamy clay, upon which is laid a bed of concrete thirty feet square and ten feet thick. The footings commence at twenty-three feet two inches square, and step off in regular courses upwards to fifteen feet square at a height of six feet. The concrete was filled-in continuously until completion. The pedestal was then run up and allowed to remain for nearly three months during the winter, after which the work was proceeded with until completion, occupying about six months more. The cap is white brick in cement, with a string-course about twenty feet below the top. Foot-irons are built inside in a winding lead up to the top. The shaft is provided with a copper-tape lightning-conductor, with iron rod and crows-foot seven feet above the cap; the tape is about 215 feet long, the bottom end being carried into a well. In August, 1888, the shaft was damaged by lightning, but was easily repaired, owing to the provision of the foot-irons built inside it. At that time the shaft was plumbed, and was found to be quite vertical. The fires were only damped down during the repairs, which occupied about eight days. With the exception of this interval they have been constantly burning for nearly six years. The repairs have been almost nil. There is also a by-pass from the destructor to the shaft for enabling the burning process to be continued when the boiler in the main flue is not required or during cleaning and repairs. No obnoxious fumes from the combustion have been perceived.

STEAM-POWER.

The steam generated in the boiler is employed for driving a pair of engines of thirty-one-and-one-half indicated horse-power, which compress air into two large receivers at Chapel Wharf, whence it passes through a five-inch main to the town quay, where it is automatically supplied to the ejectors when required for working them. The air also serves for driving the precipitated sludge through the four-inch main from the reservoirs to the destructor, for which purpose the air is led by a pipe from the receiver at Chapel Wharf to the head of the main at the town quay. A six horse-power engine, used in connection with the machinery for the preparation of fodder for forty horses at the corporation stables, is also driven by steam from the same boiler that supplies the air-compressing engines.

UTILIZATION OF SLUDGE AND REFUSE.

All obnoxious matters are collected throughout the borough in covered iron tumbler-carts of two cubic yards' capacity, which go up the inclined-roadway approach to the destructor and discharge their contents into the firing-chambers. The road-sweepings are frequently discharged into a hopper over an incorporator driven by a small engine and are mixed with the sludge as required; this is generally done in wet weather. The residue from the continuous day-and-night combustion consists of about twenty per cent of good, hard clinkers and sharp, fine ashes. The clinkers are used for the foundation of roadways and the manufacture of paving-slabs; the latter have already been used in paving several footpaths of the town and the new public baths at a cost of 2*s*. 6*d*. per square yard. The fine ashes are also employed for making mortar, with which the stables and swimming-baths have been erected, and for many other purposes. The mortar is also sold to builders at 7*s*. 6*d*. per cubic yard.

ELECTRIC-LIGHTING.

The waste heat from the destructor is utilized for producing electricity. The air-compressing engines drive a dynamo of 150 volts. At the present time the works are lighted with two arc lamps of 3,000-candle power each and twelve incandescent lamps of 16-candle power each; and four streets in the vicinity of the works have been lighted experimentally for the information of the corporation, which from the successful results obtained, resolved to extend the installation to the municipal offices, a town clock, the Hartley Institution and the town-hall at the Bar Gate. For this purpose it was proposed to place accumulators in the basement of the municipal building and charge them through a cable from the works. Circumstances having led to the abandonment of the street-lighting, the public became financially the losers, and a private company is now supplying consumers.

OTHER USES.

The destructor is also employed in lending a helping hand to a neighboring authority by supplying to the local board of Shirley and Freemantle, about two and one-half miles from the works, sufficient compressed-air to work ejectors which they have erected in connection with the disposal of their precipitated sewage sludge from a population of 15,000. The compressed-air is conveyed through a four-inch main from the destructor works to their precipitation reservoirs, thus saving them the cost of a pumping-station and bringing to the corporation a return of £200 a year, which is received for the compressed-air. Thus the destructor works are now dealing with the sludge of nearly 30,000 inhabitants.

COST.

The initial cost of the complete destructor — including engine-house, inclined roadway, chimney-shaft, boilers and ironwork — was £3,723 ($18,116.11), and the sewage-disposal works on the town quay cost about £3,000 ($14,598). This is exclusive of the Shirley and Freemantle works, which consist of three reservoirs very similar in construction to those at the town quay.

The annual expense for burning refuse is as follows:

Description.	Amount.			
	£	*s.*	*d.*	
Two stokers, one by day and one by night, at 25*s*.	130	0	0	$632.58
Two feeders, one by day and one by night, at 23*s*. 4*d*.	121	6	8	590.39
Total per annum	251	6	8	1,222.97

VALUE OF REFUSE AS FUEL.

The quantity of refuse burned per day of twenty-four hours is a little over fifty tons, so that the cost of burning is about 3½*d*. per ton.

The minimum quantity burnt per day of twenty-four hours is about twenty-five tons, which has been sufficient to maintain steam for the engines of 31½ indicated horse-power. This is equivalent to 16 cwts. of refuse per indicated horse-power for twenty-four hours, or 75 pounds of refuse per indicated horse-power per hour.

The annual expenditure for the sewage clarification and disposal is as follows:

Description.	Amount.	
Precipitating material for 365 days, averaging about 5s. per day..	£ 90	$437.94
Engine-driver and laborers at reservoirs..	128	622.84
Two men at wharf mixing manure	104	506.06
Total per annum..................	322	1,566.84

REVENUE.

The amount realized from the sale of manure and for the supply of compressed-air during last year (1891) was £600 ($2,919.60). The products from the destructor — including concrete slabs, clinkers, used for concrete foundations, and fine ashes for mortar and for foundations of footwalks — represent about £300 ($1,459.80). To these may also be added the saving of the coal which was required for working the engines previously to the establishment of the destructor.

IN a dispatch subsequent to the foregoing Consul Bradley transmitted a printed report, prepared by the engineer-inspector of the local government board of London, from which the following extracts are taken:

BURNING SCREENED REFUSE.

The burning of screened or selected refuse under steam boilers is in practice at Manchester, Bolton, Glasgow and Birmingham. At the three first-named places large grate-area, a thin fire, and frequent clinkering and firing are depended on; but at Birmingham there are special arrangements which deserve notice. At the Montague Street wharf, where by far the larger part of the refuse is burned under boilers to raise steam for drying excreta, there are thirteen multitubular boilers, eleven of them 13 feet long and two 11 feet long, and all 6 feet 6 inches in diameter. They have fire-grates 5 feet wide and 5 feet 6 inches long, fitted with patent lifting and moving fire-bars, designed to break up the fire and prevent clinkers forming in large cakes and to keep the spaces between the bars clear. The play of the bars can be regulated to suit the kind of refuse burning, or it can be stopped entirely. The effect when in use is to work the clinker to the back, where it falls over the end of the fire-grate and is removed when cool from the ash-pit. The refuse burned under these boilers is that from which the fine ashes have been screened for mixing with excreta, and there is no difficulty in maintaining steam at sufficient pressure to be used for drying excreta. There are, besides, two Galloway boilers, 27 feet 6 inches long and 7 feet 6 inches in diameter, fed with cinders screened from the refuse and mixed with slack, which raise steam for two 25 horse-power engines which drive the machinery of the yard.

THE FIRE-DESTRUCTION SYSTEM.

The escape of dust and of smell from the chimney must be regarded as defects to be remedied, especially where the air is not already polluted by factory chimneys. Much in the way of prevention may be effected by careful and systematic firing and feeding, combined with large flues or dust chambers, frequent removal of dust, and proper regulation of the draught. When these precautions do not suffice, passing the products of combustion through or over a second fire appears to be the most promising means of destroying smoke or smell and preventing the escape of dust.

In other respects the burning of town refuse by furnaces already in use appears to be successfully carried out. There is no accumulation of any offensive material at the works, and very little smell. Everything combustible is burnt within a few hours of collection without nuisance and at a cost which compares favorably with the old system of carting the refuse to tips. A valuable means is at the same time provided for effectually disposing of infected bedding and clothing, condemned meat and provisions, and the carcasses of diseased animals. Further improvements may be expected, but the results already attained show that the destruction of the refuse of towns by fire is not only practicable but is the best and often the only way of dealing with it in a manner to satisfy sanitary requirements.

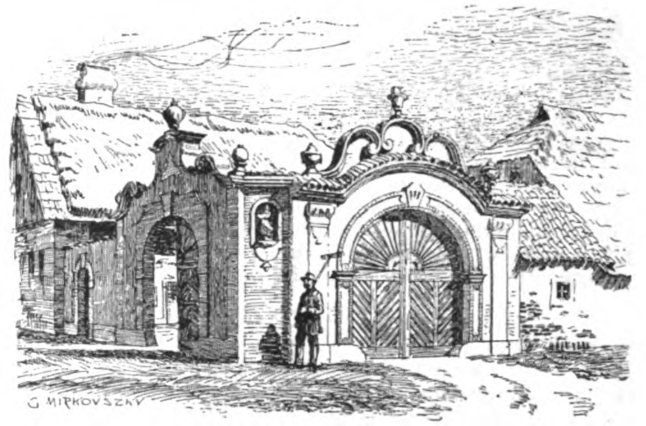
BURNING DISEASED ANIMALS AND CONDEMNED FOOD.

Considerable care is now taken in Leeds with the charging and clinkering of the furnaces. At first all the cells were clinkered and charged, one after the other, every two-and-a-half hours as quickly as the men chose to do it; but now a pair of cells are charged every twenty-five minutes regularly. The result is that the temperature in the main flue is more uniform, and there is less smoke from the chimney.

The fires are kept continuously alight, except when drawn for repairs. The furnaces are filled up and banked about 1 P. M on Saturday, and the damper is closed at 7 P. M. till 12 on Sunday night. The amount burned in the year ended August 31, 1886, in twenty cells was 35,248 tons, giving an average of 34 tons per cell per week, consisting of refuse from ash-pits, with trade and market refuse. Mr. J. Newhouse furnished the following list of other things destroyed during the same period: Eleven cows, 3 calves, 17 sheep, 4 goats, 298 hogs, 5 turkeys, 2 carcasses of beef, 28 quarters of beef, 9 cwt. of pork, 10 cwt. of pickled tongues, 12 cwt. of herrings, 218 cwt. of shellfish, 1 cwt. of sugar, 285 dogs, 109 cats, 13 foxes, 1 sea serpent; 147 mattresses, bed, pillows and bolsters; 7 blankets, quilts and sheets; 36 pieces of carpet, 7 hearth-rugs and mats, 33 pieces of wearing apparel, 1 bedstead, 1 sofa, 1 chair and 1 bundle of rags.

This is not an unusual year's work, and the destruction of diseased animals and condemned food is constantly effected without offence. On one occasion, on an outbreak of swine fever, 200 hogs were burned, and in one afternoon 50 were destroyed, 3 at once in a cell, only a faint odor of roast pork being perceptible on a hill to leeward of the chimney.

DEFENSIVE ASSOCIATION.[1]



Gateway to a Bohemian Farmhouse. From *Architektonische Rundschau.*

ON the 21st of March, 1884, a law was signed by the President of the French Republic, designed to encourage certain professions and employments, by authorizing those engaged in them to form associations for the advancement of professional interests. This law is, in substance, as follows:

After repealing a former law, which forbade the association of more than twenty members of any trade or profession without special authority from the Government, it says: —(Sec. 2.) "Professional syndicates or associations, even of more than twenty members, exercising the same profession, similar trades, or allied professions, concerned together in the production of definite results, may be freely established, without the authorization of the Government. (Sec. 3.) The professional syndicates have for exclusive object the study and defence of economical, industrial, commercial and agricultural interests."

Section 4 provides that such syndicates must deposit copies of their constitution and by-laws, and lists of their officers, with the Government officials, but Section 5 says that "Professional syndicates regularly constituted, in accordance with the provisions of the present law, shall be allowed to consult freely for the study and defence of their economical, industrial, commercial and agricultural interests."

The rest of the law is not important to our purpose, but it may be remarked that no foreigners can become members of these syndicates, that they are not allowed to hold real estate and that any member may withdraw at any time, nothwithstanding any rules or by-laws of the syndicate.

This law was probably intended more for the benefit of working-men than for that of the more highly trained classes of the community, but, even before it was signed, the members of various professions, recognizing the advantages which it offered, had made preparations to avail themselves of it. Among these were the men who have for many years conducted, with so much zeal and prudence, the affairs of the great French architectural association, the Société Centrale des Architectes de France. In February, 1884, an international congress of architects was held at Nice, and, as a result of the discussions before the Congress, the Société Centrale, which had borne a prominent part in it, appointed a Commission, to prepare a draft of a constitution and by-laws for a Mutual Defence Association, to be created among architects for the protection of their professional interests.

In May, two months after the passage of the law authorizing associations of the sort, the Commission reported to the general assembly of the Société Centrale a draft, which was, in principle, adopted by the Society, and received, two weeks later, the sanction of the Congress of French Architects, followed by the formal approval of several local professional societies. Five months afterward, the Mutual Defense Association was organized, with a large membership, which has ever since continued to increase, and the society is now an important factor in French professional life.

Although the Mutual Defense Association is distinct from the Société Centrale, which does not, under its charter, possess the special powers required, the new society is practically the child of the

[1] A paper, by T. M. Clark, F. A. I. A., read before the Twenty-seventh Annual Convention of the American Institute of Architects and the World's Congress of Architects, held at Chicago.

older one, which gives it the use of its rooms, and furnishes it with officers, the President of the Société Centrale being *ex officio* President of the Mutual Defence Association, while the other officers, although elected, are usually chosen from among the members of the older body.

As now constituted, the Mutual Defence Association consists of architects who must either be members in good standing of the Société Centrale, or of one of the great provincial societies, or must have their honorable character guaranteed by three members of the Association. Members of the great societies are only required to send notice of their wish to join the Association, but architects not belonging to any recognized society must, in addition to furnishing the guaranty of three members, receive a favorable vote from the Committee of Administration, after their names have been posted for two months in the rooms of the Association.

Upon election, each member pays an entrance-fee of thirty francs, and each year thereafter an assessment of twelve francs. The Association, in return for this, undertakes to intervene for the settlement of lawsuits or controversies in which the member may become engaged, where the dispute involves a question of professional interest, such as the extent of the architect's responsibility, the just amount of his fees, his rights in competition, or his artistic property in his work. If the controversy cannot be amicably settled, and the law has to be appealed to, the Association pays all the expenses of the suit, including counsel and court fees, besides such costs and expenses as the member may be condemned by the court to pay, if the suit should be decided wholly or partly against him. If the decision should be favorable to the member, and the opposing party should be condemned to reimburse him for the expenses of the suit, as is customary in French building cases, he is required to repay, out of the sum thus recovered, the advances that the Association may have made for his benefit. A Judiciary Council of eight lawyers, practising before different courts, is permanently attached to the Association, and advises the Committee of Administration on questions coming before it; but members are allowed, in their own cases, to select such counsel as they may wish, the Association paying the fees. On making application for aid, the applicant must submit a complete statement of the controversy, accompanied by the documents necessary to explain it. The Committee of Administration, with the help of the judiciary council, examines the papers, and decides whether the Association shall intervene in the affair. Where the dispute is purely personal, intervention is refused, but where it is partly personal and partly professional, assistance may be granted on the professional points. Usually, in French building cases, the first step is for the court to appoint one or more experts, according to the importance of the matter, to examine the work, and report to the court. French architects do not always have the highest opinion of the fairness of these official experts, especially in country districts, and where such an examination has been ordered, the Association will, at the request of a member, send one of its own members to be present at the examination, and make his own report as to matters of fact to the Committee of Administration, before the decision of the latter as to the propriety of intervention is given. Where the member is proved, or is considered by the court, to have been in fault, and is condemned to pay actual damages, besides costs, the costs and counsel fees only are defrayed by the Association. In case of the death of a member, his right to the aid of the Association, in regard to claims connected with his professional practice, passes to his heirs.

In addition to its special work, the Association, through a standing Commission, keeps and publishes a record of all cases involving matters of interest to the profession that are decided in the French courts.

It is hardly necessary to say that this beneficent association, notwithstanding the notorious indifference of architects to matters of common professional interest, has grown steadily and rapidly, and now includes several hundreds of the best and ablest architects in France. It has accumulated a large reserve fund, has intervened successfully in a great number of cases, and enjoys the benefit of advice from a standing council of perhaps the ablest lawyers, in regard to building matters, in France. How great an advantage this may be, those who have been concerned in building cases in this country, and have observed the usual incapacity of lawyers for comprehending any matter of construction, or of setting forth properly their clients' cases where such matters are concerned, can best understand.

With this account of the great French society the history of associations among architects for the defence of their interests before the courts must, unfortunately, end. In England, although the dignity and artistic advancement of the profession are well taken care of, mutual help in business matters is hardly known; and although the English architects sometimes speak with admiration of what their brethren in France have accomplished in this way, they do not seem to think of imitating their work in their own country.

In Germany, the ties of professional societies are far stronger than with us, stronger, perhaps than in any other country, and the rules of professional ethics, which include, to a certain extent, mutual support against injustice, are loyally observed among their members; but there seems to be among the German architects no specific fund for this purpose, and no association devoted exclusively to providing and administering such a fund; and it is quite possible that the resources obtained in this way would be less needed, as well as less available, under the strict control which the German law exercises over building matters than under a republican system.

With us, it is hardly necessary to say that, although an immense advance has been made in what may be called the ethical culture of the profession within the last twenty years, nothing in the way of defensive association exists among architects. The subject has attracted a good deal of interest in the profession, for there is probably no country where architects are so much exposed to impositions of all sorts, and are so defenceless against the ignorant prejudices of lawyers, judges, juries and the public, as in our own, but nothing has been accomplished, for the reason, undoubtedly, that organization for such a purpose, is, under our laws, very difficult. The present writer has often been asked for suggestions in regard to the formation of defensive societies among architects, and, several years ago, some influential architects in and about New York took the first steps toward associating themselves with this object, but none of our States seem to have general laws under which such societies can be recognized, and without the protection of some statute, of the type of the French Law of Professional Syndicates, an association of members of any profession, formed for the purpose of helping each other to carry on lawsuits against persons outside, would be looked upon with extreme disfavor by the courts.

If, however, the present state of the law in this country would hardly admit of the formation of a society for the exclusive purpose of mutual defence, it does not follow that architects may not lend their moral support, and even pecuniary aid, to protect their brethren against injustice.

For example, there seems to be no reason why the American Institute of Architects, which has very extensive powers in promoting the good of the profession, should not have a standing Jurisprudence Committee, to examine cases submitted to it by architects, and, with the help of counsel, give opinions or advice, either directly, or through report to the Directors of the Institute. An admirable feature of the French system might be imitated by authorizing this committee, on application, to make expert examination of buildings in regard to which controversy had arisen, reporting to the Board of Directors, and, on the recommendation of the committee, an appropriation from the funds of the Institute might, it would seem, with propriety be made to cover counsel fees and court costs in cases in which the interests of the profession were involved. In the discussions which took place before the French Chamber of Deputies upon the law of Professional Syndicates, a point which was urged in its favor by the Government was that, under the existing laws, controversies involving technical points were enormously expensive to the litigants, as well as to the community, on account of the cost of the expert testimony which must be called in to determine them, and that as the professional syndicates would, if the passage of the measure permitted their establishment, appoint committees from their own body to determine technical disputes for their members, these expert committees would be of great service as referees in cases before the courts. In the same way, a committee of the Institute, of the kind suggested, would be very likely to have questions submitted to it by the public authority from time to time, and would thus assist in maintaining that relation between the public and the Institute which is acknowledged to be so desirable.

DULNESS IN BUILDING OPERATIONS. — THE POST-OFFICE. — THE SCHOOL EXHIBITS AT THE FAIR. — TWO INDIVIDUAL ARCHITECTURAL EXHIBITS.

DURING these summer days all interests centre around the Fair. There might almost be said to be no interest in anything else. This fact combined with that of hard times, has put as complete a stop to any building activity as if with the close of the Fair would come an end of life here in Chicago. To be sure, certain belated buildings that were to have been finished earlier in the season are having their final touches put to them, and this gives an air of building activity to the down-town districts which is somewhat deceptive. Such have been the new Art Institute and the Athletic Club now finished, while the new Marshall Field building, the Columbus, the Old Colony, the Monadnock and several others still continue to appropriate the streets to their own use. One or two large buildings are just being begun also, but the schemes for erecting them and in fact the architects' plans also were completed before the panicky times had actually begun. In the architects' offices a tranquil summer quiet prevails, which is unbroken save by an occasional murmured prophecy of what is or rather is not to be done next winter.

With all the varied interests at the Fair it is perfectly apparent that every one, no matter what his specialty, can find more than enough to occupy his thoughts and attention, leaving regular city matters till the time comes when all this passing show shall be with us no more.

Naturally, great interest has been felt here, as every where else,

over the decision of the coroner's jury in the cold-storage accident. In the verdict binding over to the grand jury, Fire-Marshal Murphy, Director-of-Works Burnham and the President and Secretary of the cold-storage warehouse, it seems a little as if it had been decided that some one must be guilty, and not being able to exactly tell whom, it would be safer to select every one in any way connected with the unfortunate affair. There seems to be the strongest feeling of injustice done towards the Fire-Marshal and the Director-of-Works. The architect of the building comes in for no share of the censure, as his plans were approved; he was not employed to superintend the work and his plans, as drawn, were not carried out.

Since the disaster at Washington at the old Ford's Theatre, it is a little amusing to see the attitude taken by Supervising Architect O'Rourke, in regard to the Federal Building here in the city. He has, after studying the matter a little in his own office at Washington, officially notified Secretary Carlisle of his belief that the building ought to be torn down, as being unsafe and jeopardizing the lives of those whose business brings them to the building. Notwithstanding this notification, the repairs go merrily on and the place grows daily more unsightly to the eye, by the addition which is being built around the building to the sidewalk's edge.

Next in interest to the architectural exhibit made by the profession at the Fair, ought to stand the display made by the different schools. It is surprising and to be regretted considering the size of the school exhibits how poor a display of architectural drawings is made by all the countries, our own being no exception to the rule. The school work is found chiefly in the gallery of the Manufactures Building, though there are a few exhibits in other places. The displays are in themselves very large. Among foreign nations Germany, here as in other departments, is conspicuous by her painstaking and conscientious exhibit. The chemical, scientific and engineering display as well as the manual-training for boys and girls is most thorough. The Karlsruhe Kunstgewerbe Bauschule is especially conspicuous for the high grade of its work from its applied-art department. This exhibit is not so large as some others, but the quality of the work is extremely good. The wood-carving here is perhaps better than any displayed by a school of any other nation, if we except Japan. The work in metal is equally excellent and the designs in water-color, for stained-glass, wall-decoration, etc., combine a great deal of technical excellence with a certain amount of artistic feeling. The architectural drawings are correspondingly good in execution, if one can judge from the very scattered examples that are given.

Russia with a comparatively good manual-school exhibit has no architectural drawings whatever, while England is sparingly represented in this class of work. Owing to the peculiar style of Russian architecture it is especially to be regretted that some examples of students' work are not here given.

England's school display comes from those institutions which are under the South Kensington management, and glanced at as a whole would impress one as a large and thorough display. In this department the architectural drawings are as unsatisfactory as the collections found elsewhere, as they are the work principally of the elementary classes, and give but little idea of the scope of the schools, or of the work done by all grades.

All the nations above mentioned have their displays in the gallery of the Manufactures Building, while the French schools make theirs in the little French Government Building down on the Lake Shore. On entering this structure one realizes that Paris is France, for all the work here comes from that city. It is entirely from the town schools, being, of course, work of children of younger years than did the work in other displays. The drawings themselves though only the preparatory steps for later courses in art schools are extremely good. It is to be regretted that this exhibit is at present in a somewhat dilapidated condition, owing to the fact that the shelter which houses them was built as a partially open pavilion, so the fine dust has blown over the protecting glass on dry days, and apparently torrents of rain on wet ones. Even in these early efforts, however, it is curious to note that delicate artistic feeling which in maturer hands results in such delightfully perfect specimens of all kinds of art-work in this especial nation. What few pieces of architectural drawing there are, from the École des Beaux-Arts, are in the French architectural section of the Art Palace. In the French Government Building a goodly number of architectural drawings are found beside the school work, as many of the plans for existing Paris schools are displayed as well as a number of the municipal buildings.

Japan's educational exhibit is found at the most western extremity of her main pavilion in the Manufactures Building. It is quite out of the way and unless told before where it was it would only be stumbled upon by accident, except by the few people who "do" the Fair systematically. The chief display is from the Government Fine Arts School at Tokio. Among this collection is some really charming wood-carving, and a most interesting series of studies in lacquer, showing the different stages such work must pass through. A small number of architectural drawings are shown, especially noticeable like all other Japanese work for their great dexterity of handling. It is curious to notice that the mere technical parts of both their engineering and architectural work are much like our own, but besides the essential work they introduce here and there an occasional bit of their own peculiar washes and stipling. Their most pretentious study is a plan for a penitentiary, which is not characterized by any very interesting features.

Occasionably in some of the foreign buildings there is an architectural display of some drawings of some public buildings, but generally speaking such displays do not contain enough of interest to make it worth one's time to give them any special attention. These drawings have most of them served a purpose at previous World's Fairs, as many of them, such as the Spanish, have tell-tale dates upon them often dating back among the seventies.

The bulk of the school exhibits of the United States is in the Manufactures-Building gallery, and here it is especially to be regretted that the architectural departments have made so poor a showing: Columbia and Cornell have absolutely nothing, which considering the circulars they sent out and the position they take amongst technical schools is, to say the least, surprising. They may be *hors de concours*, but it is usually customary to let judges other than the competitors for the first place in any kind of a competition decide such matters. The Massachusetts Institute of Technology is far from being thorough in its display; while the drawings, which are shown, being as good as they are, it becomes a foregone conclusion that a much more interesting exhibit might have been made by the school if any real interest had been taken in the matter. As a whole the display from the Pratt Institute in Brooklyn is one of the most satisfactory, though the architectural work is evidently done by more immature hands than that of the Institute of Technology, and consequently is of a lower grade of excellence. The work of the manual-training class at the Pratt Institute is especially good, and fairly puts to shame the display from our Chicago Manual-Training school. There is about as great a difference between the Eastern and Western work in this case, as there is generally between the foreign school work and that of our own schools.

A very excellent school display is made in the Illinois State Building by the University at Champaign, in fact is the only full display made by any college. This school's greatest reputation rests with its engineering class, but some good conscientious architectural work is displayed. As might be expected from the nature of the University the practical technical work receives the chief attention, while the artistic side is more lightly touched upon. The portfolios of drawings labelled "æsthetics" do not contain the highest kind of art compositions. The entire display, however, is deserving of much credit. In the architectural department, as elsewhere, each year is carefully represented and the faults as well as the virtues of the institution are honestly shown, so that a most thorough knowledge of the methods and scope of the University can be obtained from the exhibit. It is much to be deplored that some of the other large and larger institutions of the country did not see fit to make displays equally conscientious in character.

Our own Art Institute makes but a feeble effort at a display in its architectural department, while its classes in designs come out as strong as any in any of its other departments.

Two amusing little exhibits are in this same gallery. One is made by an architect from the interior of our State and consists of an entire and independent exhibit of drawings for school-houses, designed by this same person. Why this display should thus be placed by itself there seems to be only one way to explain. Surely the gentleman's ethical principles may suffer more by the act than his drawings, as being surrounded by —— themselves there is not brought to bear on them that high grade of comparision, which might have been necessary had their originator joined with the rest of the profession in a general exhibit.

But a few steps away from this unique display, is one made by a fellow architect, but this time of the gentler sex. Her work is not all of it absolutely bad, but the curious combination of the exhibition of designs for first this, then that, is very amusing as coming from one person. This work certainly does not gain by its surroundings as before we are fairly off of some feminine bit of architecture or stained-glass, we find we are being harassed with a portion of some neighboring exhibit in the shape of a "crazy quilt" from Colorado or some productions similar in character.

The Board of Judges for Fine Arts have met and have completed the organization of the four sections which are to judge the painting, sculpture, architecture and printing in the Art Palace. The judges for architecture are W. W. P. Longfellow, United States, President; William Emerson, Great Britain, Secretary; Messrs. Paria, Spain; Spera, Italy, and Jaffè, Germany.

PILE FOUNDATIONS, CHICAGO.

THE use of deep-pile foundations has been strongly advocated as advantageous in Chicago by General William Sooysmith, M. Am. Soc. C. E., and in a recent issue of the *Technograph* he describes the work done in this direction for the foundations of the new Public Library building in that city. The system consists in abandoning the spread foundation of steel and concrete resting on the unstable clay which underlies most of the business parts of the city, and employing instead a foundation of deep piles reaching down to the bed of compact clay and gravel about forty-five feet below the city datum. The reason advanced for this change by General Sooysmith is that where independent spread foundations are used some of the largest

buildings have been observed to settle irregularly after completion. The deep piling is claimed to be much more stable.

In the new Public Library building trenches were dug on the lines of the walls sufficiently wide to permit the necessary shoring, and to include three rows of piles driven about three feet between centres. The character of the upper clay stratum at this place is shown by the fact that it crowded through the smallest crack in the sheet-piling almost as if it were quicksand. The depth of excavation permitted sawing and capping the piles to a point such that the highest level of timber used in the grillage is fourteen feet below the city datum which is about the level of Lake Michigan. From this grillage rubble masonry is carried up to the neat masonry courses of the basement. While the work was in progress, a test was made to determine the bearing-power of four of the piles of Norway pine, after they had been driven in the trench. The driving was done with a steam-hammer weighing in all 8,300 pounds, the hammer alone weighing 4,500 pounds, and delivering 54 blows per minute with a stroke of 42 inches. The last 20 feet of the driving was done by means of an oak follower. These piles were driven about two-and-one-half feet between centres.

The bearing-power of the four piles was tested by building a platform on top of them, which was loaded with pig-iron. Levels were carefully taken on each of the four. The piles stood four days with a loading of 5½ tons per pile, eight days with a loading of 37.3 tons per pile, and ten days with a load of 50.6 tons, all without a settlement exceeding 0.01 foot. In discussing these tests General Sooysmith states that if 250 pounds per square inch be estimated for point resistance, the average frictional resistance will be about 3.2 pounds per square inch of side surface of pile, or about 432 pounds per square foot. For an ordinary pile, 7 inches through at the top and 14 inches at the butt, driven 45 feet, the frictional resistance he assumes to be 59,000 pounds and the point resistance 6,000 pounds. Hence he computes a total earth-resistance of 65,000 pounds with a factor-of-safety of from 5 to 6. The resistance of the pile considered as a column he estimates at 65,000 pounds, with a factor-of-safety of 3 to 4.

Another noticeable building on deep-piles is the new Illinois Central Railway passenger-station in Chicago, a structure 180 by 220 feet in plan and consisting of an office portion nine stories high, a tower thirteen stories high and a station three stories high, with which is connected an eight-track train-shed 680 feet long. According to a paper in the same magazine, written by C. J. Mitchell, an assistant civil engineer of the railroad borings taken on the site showed from 10 to 20 feet of rubbish which had been dumped there immediately after the great fire, below which were irregular strata of stiff blue clay and quicksand. Rock was more than 60 feet below the surface. This condition of things led to the adoption of deep-pile foundations. About 1,700 were driven in all, arranged in groups or clusters under each column. Under the head-house there were eight, thirteen and sixteen piles in the groups, under the office twenty to forty-two, and under the tower one of the corner pilasters had seventy-three piles. These piles were usually arranged on the square, lining both ways, but alternating in rows 18 inches apart, so that the distance between centres was 25½ inches. This is said to be as close as they could be driven, and even when the points were spaced in this way the tops were sometimes considerably out of line after driving.

In size the piles were from 40 to 60 feet long, averaging 51 feet, and from 11 to 16 inches through at the butt end. Thirty-two per cent were black-gum, 22 per cent pine, 7 per cent basswood, 21 per cent oak, 15 per cent hickory, with a few maple and elm. A cast-iron cap was used in driving, but in spite of this 8 per cent of the heads were crushed or split. The pine piles had the poorest driving record, the heads of 12½ per cent being crushed and 5 per cent broken. The gum had 7 per cent crushed and 0.6 per cent broken; the oak had 5 per cent crushed and 0.8 per cent broken; the hickory had 3 per cent crushed and none broken, and the basswood had 8 per cent of the heads crushed. In several of the oak piles the sap wood was separated from the heart, the cores being driven through the shells. All the piles were cut down to form a point 4 inches square.

Drop-hammer drivers were used on this work, the hammers weighing 2,800, 3,200 and 3,800 pounds respectively. The best record, 26 piles driven home to a depth of at least 60 feet, was made by the driver having the heaviest hammer, although there is some doubt in Mr. Mitchell's mind as to whether this result was due to the greater weight of the hammer or to the greater ability of the crew in charge. The last blow was generally given with a fall of 35 to 40 feet, though when driving close to a building a fall of 50 feet was used with about the same success. The penetration at the last blow averaged about 3 inches, though a number went less than 1½ inches. The cap prevented much loss by brooming. The distance to which could be traced the vibration due to the driving varied with the fall, the character of the soil, and the spacing of the piles. It was easily felt at 400 feet, while the effect at 75 feet was quite marked. It is stated, however, that in doing instrumental work the vibration was sometimes less severe within 25 feet of the driver than at several times that distance.

The piles were usually driven in groups until the tops of all were below the leads when the driving was completed by means of a follower. Water was kept running around the pile at the surface while the driving was in progress, as this seemed to be of considerable aid. After the piles had been driven the tops were sawed off to a uniform height of 3 feet below datum, in order that all the timber should be below low water. As this was from 10 to 14 feet below the surface the trenches had to be sheathed and kept drained by continual pumping. After the piles were cut off and the earth excavated 18 inches below their tops, rich Portland-cement concrete was tamped in even with the tops. Oak caps 12 inches square were then drift-bolted to the centre of each pile, and the space between the timbers filled with concrete. It is believed that this piling will last many years, as pile trestles built twenty-one years ago on the same railway are stated to be perfectly sound now wherever they were below the permanent water level.

A rather interesting set of observations on the effect of pile-driving on adjacent objects is described by Mr. Mitchell. In one instance a group of sixteen piles was driven about 15 feet from a group of eight which had been sawed off to a uniform height and had waling-pieces drifted on. These waling-pieces were raised 4 inches on the side next the driver and one inch on the opposite side. Under similar conditions, when sixteen piles were driven about 15 feet from a finished pier consisting of eight 47-foot piles, 2½ feet of grillage and concrete, and 12 feet of stone masonry, the pier rose five-eighths of an inch on the side next the driver, but on the further side it remained at the original elevation. Two weeks later this pier was again tested, and the high side was found only one-fourth of an inch too high, while the other side had not changed. Again, in a group of seventy-two piles a spike was placed in the head of the first pile driven, and elevations were taken daily. The first two days the pile sank one-half inch, then rose steadily until fifty piles had been driven, when it was three inches above the first height, the greatest rise in one day being three-fourths of an inch. This pile was 55 feet long, of which 45 feet were in the ground.

ALLAIRE, N. J.: A DEAD VILLAGE.

Triumphal Arch, Piazza del Commercio, Lisbon.

LESS than fifty miles from the bustle and turmoil of New York there is a quiet spot which, from its unlikeness to anything in this very new and very wideawake country, seems to have been transplanted from the Old World. Few people have heard of it, fewer still visit it, and yet, apart from its beauty of forest and stream, it has an historic interest. I allude to the ruined village of Allaire — a few miles from the seacoast — in Monmouth County, N. J.

Ruins of any kind have always exercised a strange fascination over my imagination, and what I heard of this deserted village so excited my curiosity that I took an early opportunity of visiting it. It was a lovely May morning when, with a merry party, I set out for the drive to Allaire. The woods were aglow with the scarlet blossoms of the swamp-maple, the wild plum, and a brilliant yellow shrub which was quite unfamiliar to me. Everywhere were signs of the activity which spring brings with it — farmers were ploughing or sowing, fires of brush-wood sent their pungent smoke into the air, and signs of life were on all sides. A sudden turn in the road took us from the present into the past, from the energy and bustle of life into the silence and stillness of death.

We were in the midst of a village. Pretty little houses nestled under the shade of mighty trees. A quaint chapel stood by the brook which ran briskly down the slope, its branches carpeted with violets. A little square school-house, a counting-room or office, barns and storehouses were on either side. The silence was almost oppressive. We looked in vain for a living creature. The only sign of life was the motionless figure of an eagle standing by his nest in the fork of a dead tree. As we came closer we saw that many of the houses were in a state of decay, the window-casements gone, and their vacant places seemed like sightless eyes. The shutters of the school-house flapped in the breeze. Through the window of the counting-room could be seen quantities of papers littering the floor, while the mouldering remains of ancient vehicles were plainly visible through the cracks of the weather-beaten barns. High above the rest loomed the crumbling walls of three huge brick buildings, whose pointed arches and vine-clad side gave them a weird picturesqueness. Inside one a slender tree had taken root, and taking a turn in its stem,

looked through one of the openings where once had been windows. In the distance was a large, comfortable-looking old-fashioned dwelling, which, with vegetable and flower garden and a brood of downy chickens near by, made a contrast to the rest of the scene.

A hundred years ago, had we visited Allaire, how different we would have found it. Those great, empty, crumbling buildings were filled with machinery and men, busy from dawn to dusk. Each house was the shelter of a family, the school-house rang with merry childish voices, grave discussions were held in the counting-room, and contracts involving fortunes were signed, and in the roomy manor-house the owner of all this lived and entertained in a style and magnificence befitting his fortune — in those days considered colossal.

In the early part of the century the Allaire Iron Foundry was at the height of its prosperity. A special line of wagons carried the finished goods to New York, and brought back needed supplies, and during the war of 1812 all the iron used by the Government came from Allaire. Those great chains which our forefathers stretched across rivers and deemed themselves safe behind, the quaint gun-carriages, parts of the guns themselves, and many other necessities of war were made in these now deserted and ruined buildings. What was the cause of the failure of the foundry I do not know, but about fifty years ago the iron-works closed forever. The present owner of all this beauty and desolation, Mr. Henry Allaire, was born the lord to a barren heritage. He lives with his mother in the old manor-house, now so quiet, once the scene of so much splendor and gayety. He may be said to have realized the Biblical idea of turning the sword into a ploughshare, for he now farms the land from which for so long was drawn the material for warlike weapons. — *H. S. in the N. Y. Evening Post.*

THE ANNUAL CONVENTION A. I. A. AND THE WORLD'S CONGRESS OF ARCHITECTS.

Capitals from the Church at Rasdorf. From *Zeitschrift für Bauwesen.*

Monday, July 31, 10.00 a. m.

First Session. — The Twenty-seventh Annual Convention of the American Institute of Architects. President, Edward H. Kendall, New York. Secretary, Alfred Stone, Providence, R. I. (For details of convention see special programme issued by the American Institute of Architects.)

Monday Evening, 8.00 p. m.

Formal opening of the Congresses in the Department of Art.

Tuesday, August 1, 10.00 a. m.

Second Session. — The Twenty-seventh Annual Convention of the American Institute of Architects.

Tuesday, August 1, 2.00 p. m.

Formal opening of the Congress of Architects. D. H. Burnham, Chairman.

Papers. — "The Organization of the World's Columbian Exposition." D. H. Burnham, Chicago.[1] "The General Schemes and Plans of the World's Columbian Exposition." Frederick Law Olmsted.[1] "The Construction of Buildings, Docks, Piers, Bridges, etc." E. C. Shankland, Chief Engineer, World's Columbian Exposition.[1]

Wednesday, August 2, 10.00 a. m.

Papers. — "Conditions of Architecture in Japan." Josiah Conder, F. R. I. B. A., Tokio, Japan. (Read by Tatsuzo Soné, Member of the Society of Japanese Architects.)[2] "Public Competitions." J. Gaudet, First Vice-President of the Central Society of Architects of France, Paris.[2] "On the Use, for Transportation, of the Lagoons, of Lake Michigan, of the Intramural Railway, of the Alley Railway, of the Great Trunk Lines, of the Terminal Facilities, of the Chair System, etc., of the World's Columbian Exposition." W. H. Holcomb, Chief of Transportation, World's Columbian Exposition.[1] "The Mechanical Power Plant of the World's Columbian Exposition." Charles F. Foster.[1] "The Electrical Plant, etc., of the World's Columbian Exposition." R. H. Pierce, Chief Electrical Engineer, World's Columbian Exposition.[1] "Acoustics in Relation to Architecture." Alex. F. Oakey, San Francisco, Cal.[2] "Comparison of Paris and Columbian Expositions." Bannister F. Fletcher, Honorable Secretary, Architectural Association of Great Britain, London.[2]

Thursday, August 3, 10.00 a. m.

Papers. — "Architecture in Apartment Buildings." F. Adolphe Bocage, Member of the Central Society of Architects of France, Paris.[2] "Sculpture in its Relations to Architecture." William Emerson, Honorable Secretary, R. I. B. A., London.[2] "Economic Conditions of Architecture in America." Barr Ferree, New York.[2] "Some Considerations Affecting the Development of Characteristic Style in the United States." Henry Van Brunt, F. A. I. A., Kansas City.[1] "Ethics in Architecture." A. J. Bloor, F. A. I. A., New York. "A Review of Recent Plumbing Practised in the United States." Glenn Brown, F. A. I. A., Washington, D. C.[1]

Friday, August 4, 10.00 a. m.

Papers. — "Goverment Practice." Jeremiah O'Rourke, F. A. I. A., Washington, D. C., Supervising Architect, U. S. Treasury.[1] "The Use of Color in Architecture." H. Langford Warren, F. A. I. A., Boston, Mass.[1] "Foundations of Buildings." William R. Hutton, F. A. I. A.[1] "Fireproof Construction and the Practice of American Architects." P. B. Wight, F. A. I. A., Chicago.[1] "Statutory Regulations." William Worth Carlin, F. A. I. A., Buffalo, N. Y. "The Aeration of Cities and their Buildings." Everett T. Potter, F. A. I. A., New York.[1] "Architectural Engineering." Thomas C. Clarke, F. A. I. A. "A Review of Chicago Architecture." Frederick Baumann, F. A. I. A., Chicago.[1]

Saturday, August 5, 10.00 a. m.

Papers. — "Polychromatic Treatment of Architecture." Louis H. Sullivan, F. A. I. A., Chicago.[2] "Library Buildings." J. L. Smithmeyer, F. A. I. A., Washington, D. C.[1] "The Influence of Building Laws upon Architectural Development." Clarence H. Blackall, F. A. I. A., Boston.[1] "Association for Mutual Defence." T. M. Clark, F. A. I. A., Boston.[1] "Cohesive Construction, Past, Present and Future." R. Guastavino, Chicago. "Superintendence in Architecture." R. W. Gibson, F. A. I. A., New York.[1] "Engineering in Architecture." Louis de Coppet Berg, F. A. I. A., New York.[1]

[1] Prepared for the American Institute of Architects and read before the Congress by their courtesy.
[2] Prepared for the Congress of Architects.

ANNUAL ADDRESS OF THE PRESIDENT OF THE AMERICAN INSTITUTE OF ARCHITECTS.

Fellow Members: —

On the tenth day of January last, a meeting of your Executive Committee was called at Washington in order that, together with others especially invited, it might appear before the Senate Committee on Public Buildings and Grounds to urge its favorable report upon the Tarsney Bill which had passed the House of Representatives in the summer of 1892. The result of this hearing, which was attended by many of the most distinguished and zealous of our members, was the passage of an amended Bill which was duly signed by the President and now awaits enforcement by the Secretary of the Treasury.

An important subject for discussion at this convention will doubtless be the best method, if any, of producing good results under the existing law.

On March 22, previous to the appointment of one of our Fellows as Supervising Architect of the Treasury Department, a delegation of the Institute, which, by the request of Mr. Carlisle, was a very small one, was cordially received by the Secretary who requested, after listening to the arguments of Mr. Post, Mr. Price and your President, that a written statement be sent to him, setting forth the views of the Institute with regard to the new law relating to the selection of designs for Government buildings by limited competition.

To facilitate your understanding of the subject when called up for consideration, the following is a digest of the opinions set forth at the conference, approved by the Executive Committee, and forwarded to the Secretary of the Treasury:

In order to achieve the best results from such competitions no one should be invited as a competitor who is not known to possess the requisite education and experience to enable him to carry out his design with art, skill and economy, in case his scheme is adopted.

To secure the services of such men, in competition, it is necessary that the number of competitors should in no case be more than five, so that the chance of success for the individual may not be too small; that a definite programme of the requirements of each building should be supplied to each competitor; that it should be understood that the design of one of the competitors will be adopted; that he will be employed to prepare all necessary drawings and to superintend the work of construction, and that he will be paid for his services the fees usual in private work; that the clerk-of-the-works or deputy-superintendent, who is always at the building, should, as is usual, be appointed by the architect and be paid by the Government; that a Jury of Award should be appointed by the Secretary, in each case (to consist of two architects of recognized ability and experience, together with the Supervising Architect of the Treasury Department) whose duty would be to assist in preparing the scheme for competition and, with the concurrence of the Secretary, to award the work to the author of the best design.

Our profession so greatly desires to secure for the country the construction, in future, of public buildings which shall be examples of the best architectural art and economics, that its best men would doubtless esteem it an honor to be appointed, and would accept appointments to prepare designs in competition for any important work which it is impossible to postpone until the Bill can be amended, in the hope and confident belief that the Bill will be amended by the next Congress so that it shall provide for the payment of at least the expense of making competitive plans, and for such professional advice as the Secretary of the Treasury may require in preparing the necessary instructions and in selecting the best submitted plan.

The Secretary was also assured that, pending such amendments, the interest of the Institute is so great in the Government work, that its Executive Committee would willingly offer him its services to advise in any matters connected with these competitions in which he might desire to consult them; that it would nominate architects for the competitions, if he should so desire, and provide members for the Juries of Award; and that for the present, until the Bill can be amended, members of the Institute would make no charge for services whether as advisors or as jurors.

These views were approved by the Executive Committee and forwarded to Mr. Carlisle, who duly acknowledged their receipt from our Secretary, but has not, so far as is yet known, acted upon any of the suggestions.

An important step toward better public art has recently been taken in New York City in the formation of a Municipal Art Society, which proposes to foster the several decorative arts by instituting each year one or more paid competitions which will be modelled as nearly as possible upon the Paris competitions for the Prize of Rome. Occasionally an artist, whose work justifies the choice, will be selected to execute a work to fill some prescribed space or site; or an already existing work of art, executed by an American citizen, may be purchased by the Executive Committee.

These competitions will be open to any citizen of the United States without distinction as to age or sex, and the subject, whether architectural composition, statue, high or low relief, mural-painting, portrait, landscape, marine, mosaic, glass-work or other decoration, as well as the process and material used, whether stone, bronze, oil, wax, distemper or pastel will be determined by the Advisory Committee. The sketches submitted are to be in no case mere indications, but finished studies, clearly setting forth the entire scheme to be followed in the final work. A special jury, largely, if not entirely made up of professional men, will be appointed for each competition, which will, it is thought, be an inducement to compete to many who would not otherwise do so. The whole expense of the competitions and of executing the successful study, as well as that of purchasing an existing (or especially commissioned) work, will be defrayed by the annual contributions of the Society.

The project, which is certainly self-commending, has been enthusiastically indorsed by artists and laymen, and has received encouragement from those officially interested in the public monuments and decorations of the city. Our Chapters should at once take the initiative in forming similar societies in their respective cities, and so swell the tide of better art already splendidly risen, as the decorative success of this great national work in Chicago, as well as the development and increased appreciation of technics throughout the country so fully testify.

The public is in active and sympathetic touch with all that pertains to architecture and to its adjunct arts and sciences, and the profession reciprocally recognizes all that is being done to place it upon the highest possible plane.

On the one hand, the overflowing attendance upon the lectures on architectural and decorative subjects by Sturgis, Merriam, Rood, Ware and Hamlin, under the joint auspices of the Metropolitan Museum of Art and Columbia College, during the early months of the year; the throngs which delight to examine, not once only, but over and over again, the casts and models of the Williard Architectural Commission, which are now perhaps the greatest attraction at the Metropolitan Museum in New York; the splendid equipment of our technical schools; the founding of libraries (notably the Avery library) for the especial use of architectural students, all show great popular interest in our work.

On the other hand, the drawings last exhibited by the Art Students' League, vying as they did with the best École work in Paris; the unusually good work shown at the recent Exhibition of Scholarship and class work at Columbia College; the remarkable increase in the number of students at the principal technical schools; the eager competition for the Travelling-scholarships, and the high average merit of the drawings submitted, all indicate growing professional zeal and attainment.

Viewed collectively, it is apparent that endeavor and accomplishment are keeping pace with means and opportunity.

Travelling-scholarships, so far as my experience goes, are too frequently awarded objectively — to hand-work and not to brain-work; to him who draws cleverly and aims at the stars, rather than to him who presents a thoughtful study and conscientiously endeavors to meet and keep within the requirements of his project. Envoy drawings are therefore of especial interest as draughtsmanship and not as studies of noteworthy plan, detail or construction, which latter might well be the case should the subjective element enter to a greater degree into the selection of the envoy.

Baron von Geymüller has so far matured his project, which was set before you last year, as to issue a Prospectus of his Archives, or "Thesaurus of Architecture and its Subsidiary Arts," as he now calls his work, together with preliminary plates, copies of which have been sent to each Chapter for approval and coöperation.

In the recent death of Richard T. Auchmuty (once a member of this Institute and for twenty years a partner of James Renwick) our profession loses an ardent supporter and helper, and the whole country a benefactor. He found organized labor in the hands of foreigners who protected their own interests to the virtual exclusion of native-born apprentices. Deeply impressed by the danger of the situation to American youth, he established a trade-school in the city of New York, modelled after the best similar schools of Europe. This he did, not through State aid as is universally the case abroad, but by his own untiring energy, eagerly seconded by the wealth and sympathy of his wife. In 1881, the year of the organization of the school, he began with thirty scholars, while now the number of yearly graduates is over six hundred. The endowments of Mr. and Mrs. Auchmuty, together with that of Mr. Morgan, will enable this philanthropic and patriotic work to go splendidly on, giving skill and dignity to labor and independence of foreign dictation to the laborer.

We are soon to meet in Congress our professional brothers from other parts of the world. We rejoice in this opportunity to welcome them individually and to honor them as bringing to us, anew, the traditions of Jones, Wren, Pugin and Barry; of Leighton and Morris; of Delorme, Mansart and Viollet-le-Duc; of Flandrin, Baudry and Puvis de Chavannes; of the marvellous epoch of Saint Louis; of the scholarly achievements of Germany; of the romantic splendors of Spain, and the exquisite grace and beauty of the "new birth" in Italy.

REPORT OF THE BOARD OF DIRECTORS OF THE AMERICAN INSTITUTE OF ARCHITECTS.

THE meeting of the Institute in annual convention in midsummer, for the purpose of conforming to the date fixed for the Auxiliary Congress of Architects from all parts of the world, in connection with the World's Columbian Exposition, makes our year a very short one, and prevents as full an attendance of its members as could be desired.

At the first meeting of the Board of Directors, the resignation of our former Secretary, Mr. Dankmar Adler, who had brought to the work that energy and insight for which he is distinguished, made it necessary for the Board of Directors to elect some one in his place, and it was not until a month after the opening of the year that his successor was able to assume the duties of the office.

There has been during the year no marked event to chronicle, except that crowning event in the architectural history of this country, which has brought us to this city at this time, and which will be properly noticed in fitting terms at another stage of our proceedings. No new Chapters have been formed, and there has been no marked increase in the membership. In fact, the increase is less than we ought to look for, in view of the importance to every member of the profession of the work which the Institute has done in the thirty years of its existence, to promote the best interests of the profession and to elevate its tone and the standard of professional practice. Seven members have been elected and five names are to be at once balloted for, having been approved by the Board at its meeting held here in Chicago on July 30.

To what is it due that we do not attract a larger constituency? Why are so many of the strong men in the profession outside of our organization? Is it the independent spirit of Americans? Is it because of the not wholly satisfactory relation of the Chapters to the Institute? Or, is it simply the indifference which comes from absorption in a most engrossing profession, and which allows itself to reap the advantages of the conditions without any effort to shape them?

The question of the relation of the Chapters to the Institute requires your attention as well as that of the Board of Directors, but before any changes are made, great care should be taken to make sure that the changes proposed are likely to be beneficial or otherwise. It is undoubtedly true that the condition requiring a person to be a member of a Chapter before he can be a member of the Institute, has its drawbacks, but it is respectfully suggested that the matter of dues to the Chapters be so arranged that those who cannot partake of all its benefits should be required to pay less than those who do. It seems to the Board of Directors that the dues of the Institute are not burdensome, compared to the benefits which every member indirectly receives, even if he fails to see its direct value.

The matter of the Bill to regulate procuring designs for buildings to be erected under the Treasury Department of the United States Government, has been so fully treated by the President in his annual address, that it is unnecessary for the Board to say more than that it looks to the Secretary of the Treasury and the present incumbent of the office of Supervising Architect to see that the Bill is faithfully carried out; and from the assurances of the latter, we do not believe that we shall be disappointed, unless there is some radical defect in the law. If that is the case, the near approach of a session of Congress will give opportunity to amend it. In order to preserve a complete history of the Institute, it is recommended by the Board of Directors that its Executive Committee be empowered to arrange with Mr. A. J. Bloor, who was for so many years its secretary, and who is more familiar with its history than any other person, to compile and write the same and to pay him such sum of money as may be agreed upon, not exceeding $1,500.

Since the last annual meeting the Institute has lost by death two of its active members and four of its honorary members. The deceased Fellows were: J. H. Kirby, who died January 28, 1893; and Pierce P. Furber, a member of the Board of Directors for three years and also a member of the St. Louis Chapter, who died April 6, 1893, within a few weeks of his fortieth birthday. Mr. Furber

brought to the practice of his profession a strong and active body, a well poised mind, a keen intellect and uprightness of purpose, and large professional attainments, which won for him many firm friends, the confidence of his partners and clients and the good-will of all who were brought in contact with him.

Of the Honorary Members, Henry Sargent Codman was so closely allied by his practice, his friendship and his connection with the architectural treatment of the grounds of the Columbian Exposition, that we all regarded him more as a fellow-member of our own profession than as one outside of it, and it was a delight and an honor to the American Institute of Architects at its last convention, to make him an Honorary Member. Young in years, mature in judgment, by his death the profession of landscape architects has lost one, whom, had he lived, would have been a fitting successor to his friend and business associate Frederick Law Olmsted.

Eugène Létang, Professor of Architecture in the Massachusetts Institute of Technology, and Richard Auchmuty, of New Yo.k, have left their indelible impress upon hundreds of men in two different walks in life; the former on the numerous graduates of an institution which has done so much for the profession of architecture throughout the country, and the latter on the graduates of the trade schools which were founded and maintained by his individual efforts. The fourth Honorary Member, Henry Whitestone, deceased but a few days ago, at the ripe old age of threescore years and fourteen, at his home in Louisville, Kentucky, where, forty years ago, in the prime of life he was in the active practice of his profession, erecting buildings in that perennial style of Italian Renaissance, of which he was a master, and from which he was never lured by passing fashion.

The number of Chapters of the A. I. A., is......	23
Number of Fellows..........................	475
" " Honorary Members.................	52
" " Corresponding Members............	55

The Directors would respectfully nominate for Honorary Members of the American Institute of Architects, the following persons: Halsey C. Ives, St. Louis, Mo.; Frank D. Millet, New York, N. Y.; Lyman J. Gage, Chicago, Ill.; and for Corresponding Members: Prof. F. W. Putnam, Curator Peabody Museum, Harvard College, Cambridge, Mass.; Professor Goode, Smithsonian Institute, Washington, D. C.; Theodore Cooper, New York, N. Y., and Latham Anderson, Cincinnati, Ohio.

The Illustrations

[*Contributors are requested to send with their drawings, plans and a full and adequate description of the buildings, including a statement of cost.*]

A COURT-ROOM IN THE ALLEGHENY COUNTY COURT-HOUSE, PITTSBURGH, PA. H. H. RICHARDSON, ARCHITECT.

[Gelatine Print issued with the International and Imperial Editions only.]

"GRAY TOWERS." HOUSE FOR W. C. HASTINGS, ESQ., YONKERS, N. Y. MESSRS. DEHLI & CHAMBERLIN, ARCHITECTS, NEW YORK, N. Y.

HOTEL AND OFFICE-BUILDING FOR S. H. JANES, ESQ., TORONTO, CANADA. MESSRS. ELLINGWOOD & PARISH, ARCHITECTS, NEW YORK, N. Y.

The basement and lower two stories are of gray limestone, while the upper portions are of light brick and terra-cotta. The columns, wall-linings, etc., of the main entrance are of marble.

PLANS OF THE SAME.

HOUSE FOR JOHN FITZGERALD, ESQ., MERCHANTVILLE, N. J. MESSRS. MOSES & KING, ARCHITECTS, PHILADELPHIA, PA.

SKETCHES FOR SUBURBAN HOUSES. MR. C. H. BLACKALL, ARCHITECT, BOSTON, MASS.

[Additional Illustrations in the International Edition.]

THE MAIN STAIRCASE OF THE ALLEGHENY COUNTY COURT-HOUSE, PITTSBURGH, PA. H. H. RICHARDSON, ARCHITECT.

[Gelatine Print.]

VESTIBULE AND MAIN STAIRCASE OF THE ALLEGHENY COUNTY COURT-HOUSE, PITTSBURGH, PA. H. H. RICHARDSON, ARCHITECT.

[Gelatine Print.]

WHITE LODGE, RICHMOND PARK, ENG.: GARDEN FRONT.

ENTRANCE-HALL OF THE SAME.

YORK COTTAGE, SANDRINGHAM, ENG.

The buildings we illustrate this week have gained additional interest by their association with a union which has gratified all the inhabitants of Great Britain. The readers of this journal are not behind their fellow-subjects in loyalty, and we are confident that the marriage of the Duke and Duchess of York, which was celebrated yesterday, afforded them an occasion on which they could rejoice and unite in the general desire for the happiness of the Prince and Princess.

Note: — Owing to custom-house delays, the issuance of the preceding three illustrations properly belonging to this number must be postponed to next week.

Notes and Clippings

Dangerous Church Ceremonies. — Details of the panic in St. Stephen's Cathedral, Vienna, on Wednesday last, show it to have been by no means unjustified. The first account stated that a bunch of Alpine flowers which a pilgrim was carrying at the end of a stick caught fire at the candle placed upon an altar. This is literally true. But it seems that the altar was not fixed. Maidens and children clad in white — muslin, or some such airy stuff — were carrying it in procession, decked with paper flowers, among the throng, many of whom, doubtless, wore summer clothing This was dangerous enough, seeing that the vast area was packed with hysteric devotees as close as they could stand. But, in addition, those excited worshippers thought fit to offer votive candles, fixing them round the altar as it passed by. No marvel that dried flowers at the end of a stick caught alight under such circumstances. Had the whole crowd burst into flames, as at Lima, it would have been a natural result. And then we should have beheld a scene compared with which the horrors of the Burg Theatre would have been trivial. For when the dense mass of people surged screaming towards the doors, all the streets and houses of the neighborhood emptied, and another mass ran to the doors from the outside, blocking them so completely that not a soul escaped till the firemen and police arrived. But is it not to be hoped that authorities in our time will recognize the necessity of forbidding dangerous performances in a place of worship as in a place of entertainment. — *London Standard.*

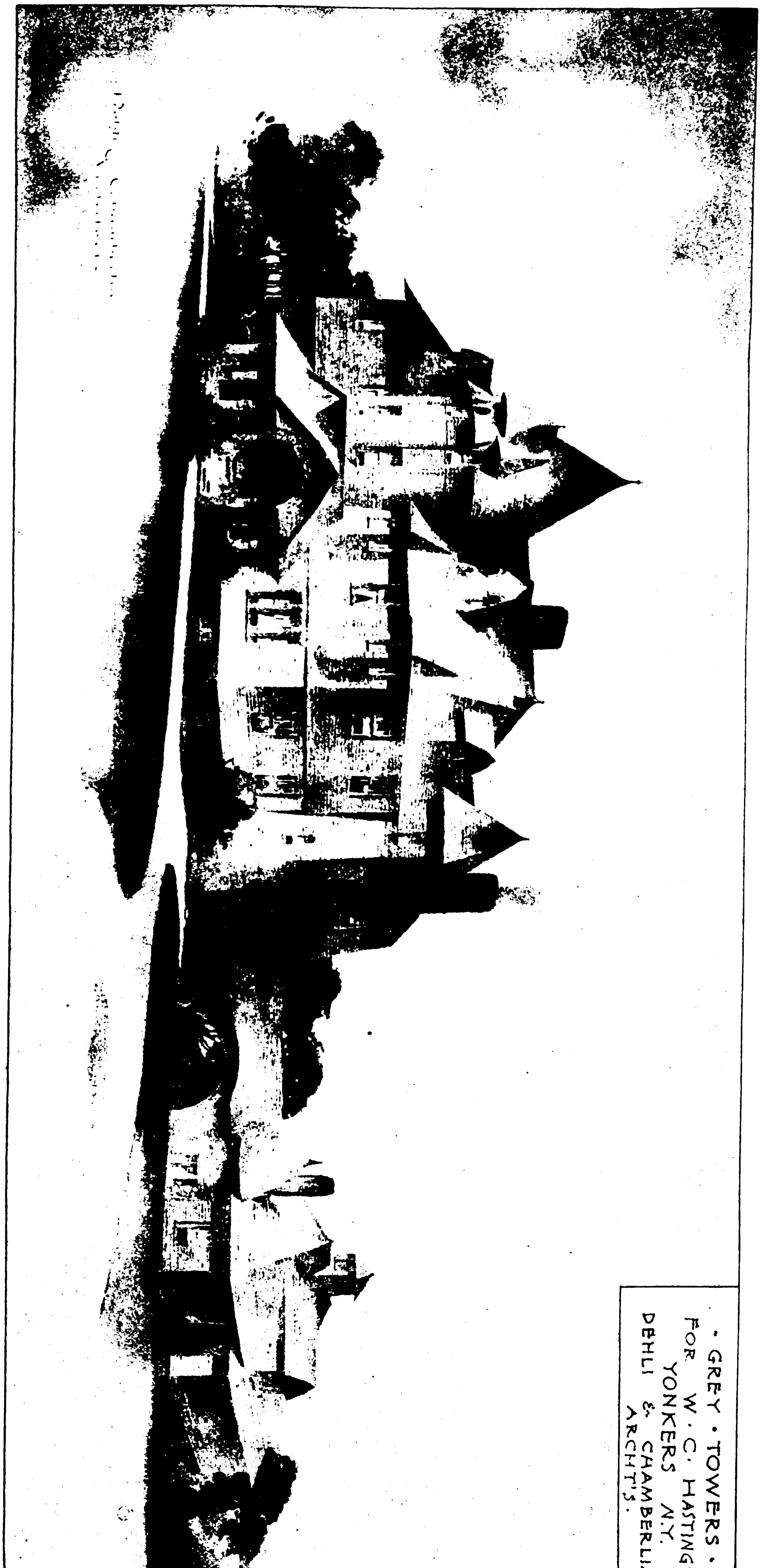
American Firemen Ridiculous. — Nothing will have been more interesting at the show than the way the Portuguese regulars manœuvre their apparatus or more ridiculous than the impractical circus-performance of the specially-trained Kansas U. S. A. athletes, with whose assistance Chief Hale is advertising his water-tower. — *The Builder.*

A Large Cylinder of Window-glass. — George Grovlech, a Belgian glass-blower working at Jeannette, Pa., has blown a cylinder of window-glass that cut a sheet clear of blemishes 59 inches by 92 inches. This, it is claimed, is the largest cylinder of window-glass ever blown. — *Invention.*

Trade Surveys

Now that the financial depression has assumed threatening proportions, a great many far-looking business men are trying to calculate the probable extent of the damage already done, and likely to be done before the storm is over. There is nothing more elusive and difficult to weigh and measure, than the influence and momentum of a financial panic. But, using such knowledge as is within reach, some conclusions may be drawn, which may serve a good purpose at this time. In a general way, it can be said that much less harm will be done than is now generally apprehended,— the reason for such a statement being the fact that our constitutional conditions are now better than they have ever been; our policies and methods are fixed; our knowledge of the laws of trade and commerce are more thorough, and our control over the agencies of production and distribution more complete. Therefore it is, that less harm will result from unfavorable conditions, no matter how they may have been precipitated; and the present financial situation is one of these. It is not necessary to discuss the question as to whether the causes to which the present unrest are attributed are the correct ones or not; time will show this; but we can positively assert that the people of the country, from its bankers to its day-laborers will learn valuable lessons before the depression is passed. Already much has been done towards checking rash enterprise, preventing the too rapid accumulation of capacity of all kinds. The danger of the past two or three years has been in that direction; but the tendency has been pretty thoroughly corrected this year, and much of the complaint coming from trade-circles is, that production has been restricted so much, and sales also. This is an advantage in more ways than one. So far as can be learned, the falling-off in building operations is almost too trifling to note; the amount may not fall more than five per cent below what would have been undertaken had all gone on well. In the matter of machinery, good authorities assert that there has been no decline in the demand, and that the adding of new capacity is going on, without regard to the financial depression. Jobbers at New York state that a very conservative policy is being followed by purchasers of shop and mill goods everywhere, and this statement is borne out by the reports of wholesalers dealing in cotton, wool, iron, steel, lumber, leather and a score of other raw materials. Large bodies of laborers are being disemployed. The full effect of the stoppage of the silver mines has not yet been felt, and perhaps will not be for months. Thousands of miners are seeking a way eastward. Tens of thousands of Western shop workmen are now idle, without prospect of reëmployment. The effect of this will be to stimulate labor organization, although there can be no prospect of immediate advantage from it. Conditions like these always stimulate labor agitations, with the result of increased membership in all labor organizations.

S. J. Parkhill & Co., Printers, Boston, U. S. A.



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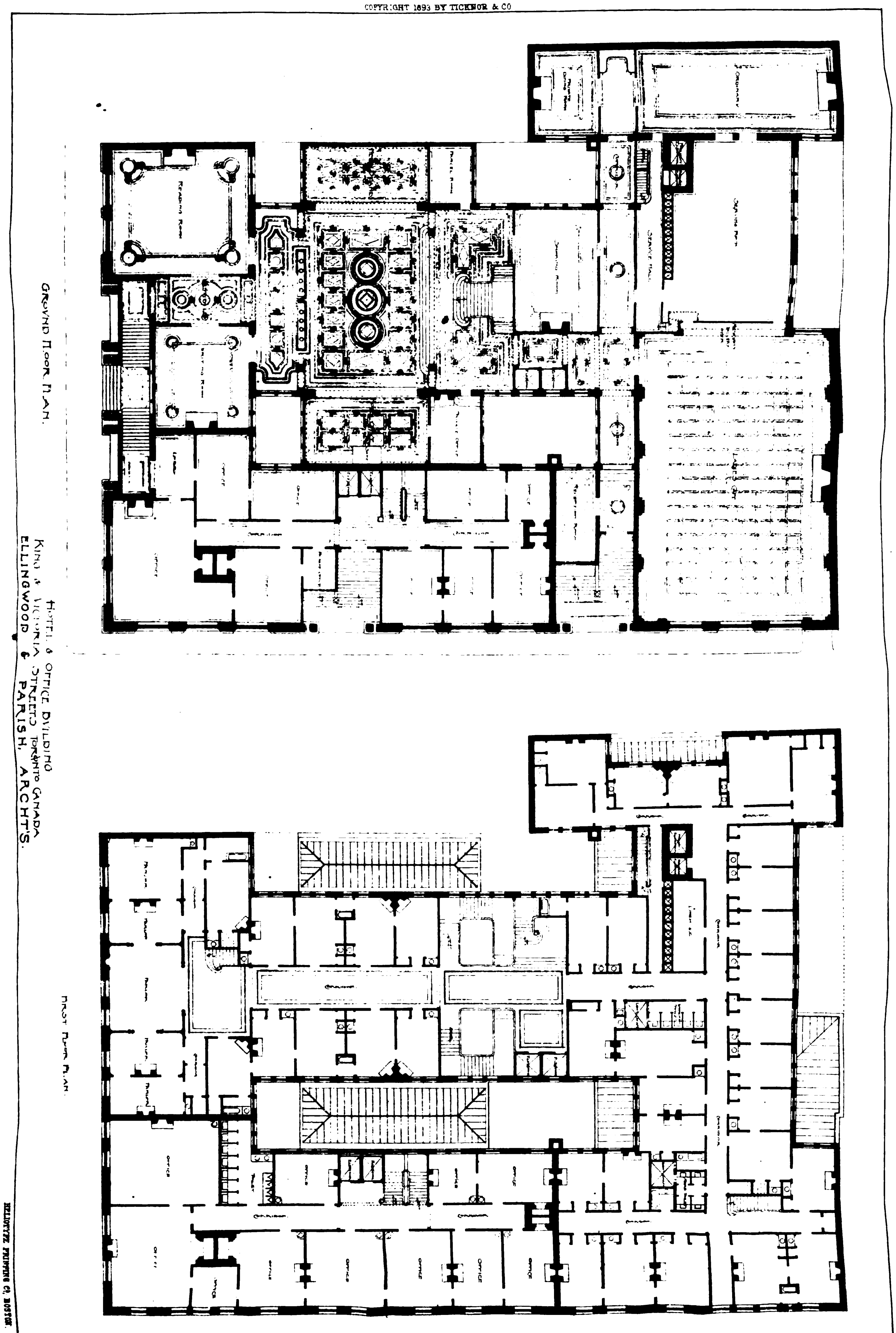
Ground Floor Plan.
Hotel & Office Building
King & Victoria Streets Toronto Canada
Ellingwood & Parish, Archts.
First Floor Plan.

American Architect and B

· HOTEL AND OFFICE

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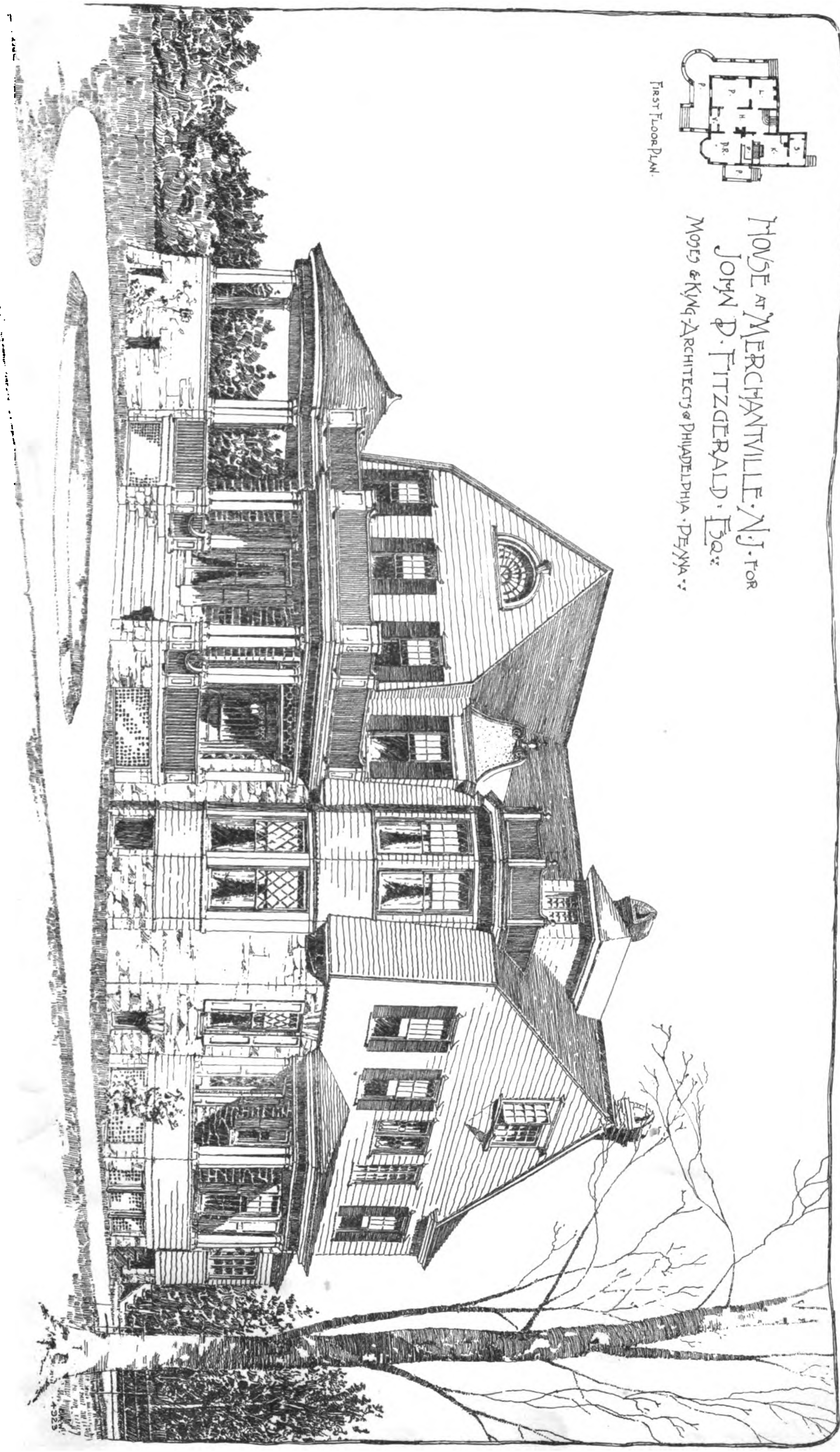
FIRST FLOOR PLAN.
HOUSE AT MERCHANTVILLE, N.J. FOR
JOHN D. FITZGERALD, ESQ.
MOSES & KING, ARCHITECTS, PHILADELPHIA, PENNA.

AMERICAN ARCHITECT AND BUILDING NEWS, AUG. 5. 1893. No. 919.

SKETCH DESIGNS FOR SUBURBAN HOUSES

C. H. BLACKALL ARCH'T.–BOSTON

KANSAS CITY

SALEM

HELIOTYPE PRINTING Co. BOSTON

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AUGUST 12, 1893.

CONTENTS

THE closing hours of the Convention of the Institute seem to have been peaceful. Although a great many architects were in Chicago at the time of the Convention, most of them seem to have contented themselves with looking in for a few minutes at the meetings, and then returning to their more imperative duty of sight-seeing. One interesting feature of the second day was, however, the adoption of an Institute badge, designed by Mr. R. Howland Hunt, the accomplished son and associate of Mr. R. M. Hunt, and consisting substantially of the Institute seal, reduced in size, and rendered in enamel and gold. These badges were on sale at the Convention, for $2.50 each, and we suppose that persons entitled to them can procure them of the officers of the Institute. Speaking of this reminds us of a proposition which was once made at an Institute Convention, that rubber-stamps should be issued to the members of the Institute desiring them, containing perhaps the usual legends of a dating stamp, enclosed in the ornamented *vesica* of the Institute seal, or otherwise distinguished in such a way as to show that the proprietor was a member of the Institute. The French Société Centrale provides its members with such a stamp, and its impression upon the thousands of drawings and other documents which go out of an architect's office might, one would say, do a great deal to advertise the Institute, and suggest the advantages of belonging to it. When the matter was brought up before, objection was made that a person might join the Institute, and get his stamp, and then misconduct himself, and, as the Institute could not get his stamp away from him, it might become connected with unworthy practices; but a similar liability does not affect the usefulness of the diplomas of professional schools, and, the Institute membership being taken exclusively from among men of mature years, and well-known character, it is hard to see how such an objection could have any appreciable force. Moreover, the Institute itself, in its early days, bestowed on its members a diploma, which was very highly valued, and does not seem to have been abused.

WE are, however, digressing from the subject, which is the acts of the past Convention, not the possible proceedings of future ones. After the balloting for officers, the result of which was given in our last issue, a vote was taken, to the effect that, unless the Directors should appoint otherwise, the next Convention should be held in New York. The vote for adjournment, after the usual complimentary resolutions, was then taken, the sessions of the Convention having lasted only two days. No papers were read at the Convention, the managers having decided to retain them, to be read before the larger audience of the International Congress of Architects, the sessions of which followed immediately after those of the Convention. The programme of the papers for the Congress has already been laid before our readers.

A LAW was passed at the last session of the Massachusetts Legislature, providing that any city or town in the Commonwealth may, by ordinance, establish, parallel to the outside line of a highway, and not more than twenty-five feet distant therefrom, a building line, beyond which no building may thereafter be erected. Some of the Boston papers comment very favorably on this law, supposing that it will increase the beauty of suburban towns, by preventing any one from thrusting his house in front of the line to which his neighbors have restricted themselves, and will greatly diminish the cost of future street-widening, inasmuch as there will be no buildings to be removed from the ground which must be taken for widening the roadway. At first sight, this seems plausible, but, in practice, we imagine that the effect of the law will be very different from what these editors anticipate. If all the streets in a given town were subject to municipal ordinances, the establishment of building-lines would certainly be desirable, but, in point of fact, this is far from being the case, most of the building operations in the suburban towns about Boston being carried on away from the public thoroughfares, on private streets, over which the town has no control whatever. In the city of Newton, which is a good type of the Massachusetts suburban community, more than half the streets, aggregating about thirty miles in length, are private ways, and on these private ways nearly all the building in the city is done, very few houses being erected on the long, dusty, public high-roads. It is obvious that, in a town like this, the acceptance of the authority given by the statute, which deprives every owner of property abutting on a public street of the use of one-fourth of his land, supposing his lot to be a hundred feet deep, would place a premium on lots abutting on private streets, which would be exempt from the operation of the law. However sensitive owners may be to landscape beauty, they rarely wish to be forced to contribute out of their own pockets to the æsthetic enjoyment of other people, and, particularly in the business parts of such towns, which are honeycombed with private ways, the adoption of any such rule would lead owners to secure their rights at once, by building out to the boundary of their lots, before the public should acquire a right to interfere with them; thus bringing about just the state of things that the statute is intended to prevent. Of course, we agree with the Boston editors and the Massachusetts legislators in thinking it desirable to reserve a uniform space in front of the houses in new neighborhoods, but it is certain that such planning cannot be imposed by force upon owners so long as prevails the present system, of having streets built entirely by private proprietors, without direction or assistance from the public authority. In Boston itself, where the laying-out and construction of new streets is vested solely in the Board of Survey, the owners have to submit to the planning prescribed for them, whether they like it or not, although even here we doubt whether an owner could legally be compelled to abandon without compensation the use of twenty-five feet from the front of his lot; but where there is no such control, it seems to us that the only way in which the town could influence private owners would be to promise them something in return for placing restrictions on their lots which would accomplish the results desired. If, for example, the town would relieve from taxation a strip twenty-five feet wide from the front of lots abutting on private streets, on condition that they should be so restricted that the strip could never be built upon, owners would probably be willing, in most cases, to accept the offer, and, considering the increased attractiveness of the streets, and the taxable value of the houses likely to be built on them, it would probably prove, in the end, a profitable transaction for the town; but, except where some bargain of this sort is made, it is difficult to see how any good results can follow from the new law.

A LITTLE festival was held lately at the dedication of the new "columbarium" of the United States Cremation Company, at Fresh Pond, on Long Island. It seems that the bodies of one thousand and ten persons have been incinerated by this company since its crematory was built. Out of that number six hundred and fifty were men, two hundred and seventy women, and only eighty-eight children. This seems to indicate, what is natural enough, that the idea of cremation is more popular among men than among women, who would be more likely than men to shrink from novel experiments in connection with the solemn mystery of death, while very few, either of men or women, seem to find it in their hearts to commit the bodies of their little children to the incinerating oven. Another curious circumstance is that less than one-third of the bodies cremated were those of persons born in this country. Of the six hundred and seventy-five foreigners so disposed of, five hundred and ten were Germans, thirty-four were English, and the rest were divided among many nationalities.

ALTHOUGH New York, as having a large German population, would naturally furnish a considerable proportion of Germans to those choosing disposal by cremation, the ratio of Germans to the population is very far from accounting for their great preponderance in the crematory lists. As these lists class all persons as Americans who were born in this country, even though their parentage, language and associations were all German, it is fair to assume that not more than one-fourth of the bodies consumed were those of persons brought up in American ways of thinking and feeling. While this indicates, probably, a greater readiness on the part of the Germans to adopt this philosophical and scientific method of disposal of the dead, it also seems to us to indicate that there is still, to Americans, a certain shock in the idea of burning the body that has belonged to a beloved person. This is not at all to be wondered at, for the Americans are probably, with the exception of the French, the most sympathetic and tender people in the world; but the effect of the attraction which cremation has for one part of the population, and its repulsion for another, seems not unlikely to lead, in time, to its adoption as a test of religious belief, or rather, of unbelief. Rightly or wrongly, the Germans are commonly supposed in this country to be a nation of materialists, and, while the relatives of a person deceased might not find anything alarming to their sensibilities in the idea of placing the ashes of their child or brother with those of his friends, or other members of his family, whose religious training had been similar to his, they would be very likely to object to putting them with those of persons reputed to have no religion whatever; and the suspicion that this might be the case would lead to inquiry as to the religion of persons previously received. Of course, as cremation is to be advocated on hygienic grounds alone, any mixing-up of religious questions with it is to be regretted, but in the interest of its promotion as a sanitary measure, it is time that it should be shown in an aspect to please those who are not materialists. There is no reason why it should not be so shown. A crematory has been built in the consecrated ground of Père Lachaise, and there is no reason why they should not be placed in all large cemeteries, instead of setting them up in picnic groves, which seems to be the present practice. As to the columbaria, any architect will understand that quite as much opportunity for artistic commemoration of the dead would be afforded by a well-designed building, with room enough for individual memorials, as by the average cemetery lot, and we do not know why, in the next generation, if the matter is properly managed, our consecrated columbaria might not be treasuries of art.

A VERY destructive fire took place the other day in London, in the old and solidly built district between Leadenhall Street and Houndsditch, near the Bank of England and in the same block with the banking-house of Baring Brothers, well known to American tourists. The origin of the fire seems to be unknown, but before it could be stopped, thirty buildings had been destroyed, with property valued at seven and one-half million dollars. The burned buildings were mostly occupied as warehouses, by dealers in stationery, clothing, tea, wines, furniture and so on, and were probably closely packed, but the small size of these old London buildings, compared with the vast dimensions of modern warehouses, ought, it would seem, to have prevented the fire from gaining much headway. That even this subdivision of the space was insufficient to prevent a great conflagration simply adds a little more to the evidence tending to show that the effect of the heat generated by the burning of such masses of inflammable goods as are gathered together in warehouses is almost irresistible by ordinary building materials, and that a structure which will hold such goods safely, while not an impossibility, is something that few persons have yet succeeded in designing.

WE have received another sample of the well-known court-house competition "invitations," announcing that on a given day certain persons would receive and consider quarter-scale plans, specifications and estimates, accompanied with full details of interior work and decoration, and bonds for completion within a specified sum, for a court-house, and would thereafter "arrange" with the architect, if any, whose plan should be accepted, for his compensation for supervision, etc. There is nothing novel about these terms, which are such as people who are ignorant of architects' work often think it keen and businesslike to offer. Of course, no real architect ever spends any time over them, unless to laugh at them, but they serve the purpose of bringing court-house committees and builders' clerks together, and, as the committees are perfectly satisfied with builders'-clerks' architecture, while the builders' clerks do not need to be squeamish about their fees as designers, if they can secure for their principals the contract for constructing the building, everybody is satisfied. Our correspondent observes that he would be glad, when he receives documents of this sort, to be able to send back some sort of tract, to show the persons who suppose they are doing him a favor, in pointing out to him a chance for employment, what architects really think about competitions, and he asks if we know of any missionary literature of the sort. The Boston Society of Architects, some years ago, published a small tract on competitions, of which it distributed a large number of copies among its members, to be used for this precise purpose. Copies would probably be gladly forwarded by the Secretary of the Boston Society of Architects, 9 Park Street, Boston; but the practice of competition has been so much improved within the last few years that the Boston pamphlet, although still very useful, is a little behind the times. It is, however, used as evidence in the courts, and as this would be the case with any official document of the kind, it is of great importance that such tracts should be kept carefully revised, and should be supported by the authority of as large a part of the profession as possible. For this reason, it would be very desirable to have the Institute undertake the task. The Institute has already a very good Committee on Competitions, which might do worse than present such a tract in the form of a report, which could be printed and served for distribution. We are sure that all architects of experience will agree that incalculable good might be done with such a document. People generally mean no harm to architects. When they offer them compensation at the rate of a dollar-and-a-half a day for making plans and specifications, they do so because they are informed that it is the regular thing for architects to conspire with the builder to steal for themselves a large slice of the cost of the building, and they think that a liberal opportunity for stealing, with a trifling fee, to save appearances, for the plans, is all that any one ought to ask. So in other things. They are told of some self-made architects, who can easily make full plans and specifications for a court-house in twenty-four hours, and it does not seem to them unreasonable to ask half a dozen competitors to do so much. It is not until they are told of the months and years of study that a real architect spends on his designs that they think of the difference between such work and that with which they are familiar; and, as old architects can testify, the idea of the existence of a being who, having such good opportunities for stealing as an architect, really and consistently refrains from availing himself of them, makes its way with difficulty through the provincial skull. When the public mind is set right on these points, architects will have less reason to complain of the treatment that they receive from court-house committees, and, if architects themselves will not take the trouble to set it right, no one else is likely to do so for them.

CITY GATES.[1] — I.

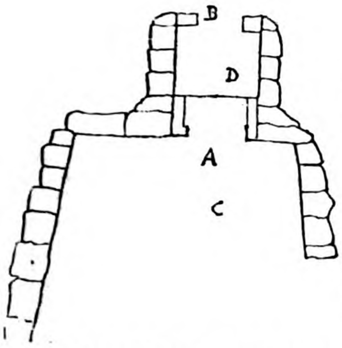


Fig. 1. Gate of the Lions, at Mycenæ.

FROM earliest times down to the invention of cannon, city gates uniformly presented the characteristics of one or several exits in a fortification wall, accompanied by works of defence. The latter became useless after the advent of artillery in the fifteenth century and gradually disappeared, or were retained in some cases simply out of respect for the past and in order not to break too abruptly with its traditions. During the Renaissance, in fact, these towers, battlements, etc., had ceased to exist except under a form in some measure ornamental; the decorative purpose evidently predominated over the defensive. The gates of the seventeenth and eighteenth centuries, inspired by Roman arches, became purely decorative. And lastly, during the nineteenth century these constructions have been transformed into barriers designed solely to facilitate the collection of local revenue duties; this new programme but very rarely serves as a pretext for the erection of anything monumental.

One of the most ancient and most beautiful of city entrances is the famous Gate of the Lions, at Mycenæ [See "*Construction*," p. 468, Figure 12]. It is one of the principal monuments of the Heroic Age. It occupies the northwest angle of the Acropolis wall and is constructed of hard breccia. The height, measured beneath the key, is $10\frac{1}{2}$ feet; it is $10\frac{1}{4}$ feet broad at the base and $9\frac{1}{2}$ at the top. The stones are very ingeniously corbelled above the lintel, so as to relieve this monolith of the superincumbent weight. A triangular opening is thus left, which is filled-in with a handsome basaltic slab, two feet in thickness; on this are sculptured two lions reared on their hind-legs, their fore-paws resting on an altar-table, supporting at its centre a smooth column. The plan given in Figure 1, will explain the defensive features. The gate proper is at *A*; *B* is a postern, and *C* a passage, 50 feet long by 30 feet broad, between the two reëntering walls of the citadel. Here the enemy could not march more than seven abreast, and they would find themselves exposed on three sides to the arrows fired by the besieged from the top of the walls. If, however, the besieging forces should succeed in passing the gate, the postern *B* then offered another obstacle to their progress; and this was the more easy to defend because missiles could be hurled on the enemy from four directions at once. Clearly, the object of the constructor was to give the greatest

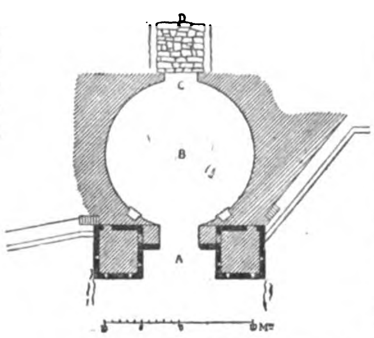


Fig. 2 Plan of the Gate of Messene.

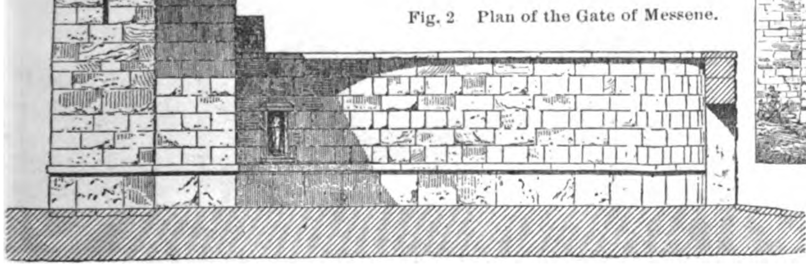


Fig. 3. Section of the Gate of Messene.

possible importance to the protection of the approach to the gate, so as to prolong the defence on the inside. This tendency to consider the city gate merely as the last of the obstructions to be carried will be observed later in the construction of French mediæval gates and their approaches.

Almost all ancient gates, with the exception of the one just described and a very few others, were built on the same plan;

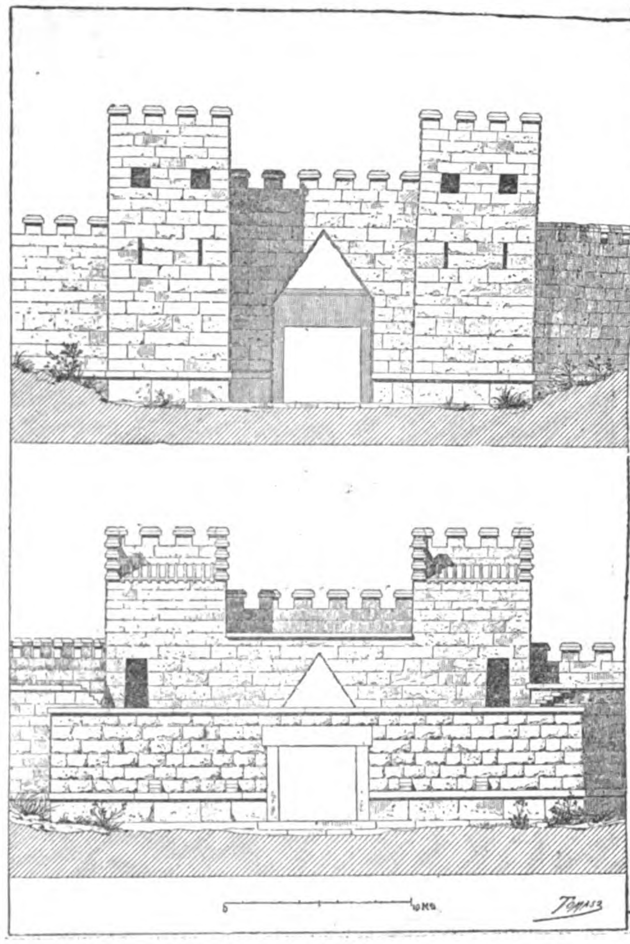


Fig. 4. Gate of Messene.

namely, one or two exits for chariots, and often two passageways for pedestrians, pierced in a wall flanked on the outside by two rectangular or semicircular towers. As examples of gates with but one exit, those of Messene and Perugia and the Porta Ostiensis at Rome may be cited. Among those

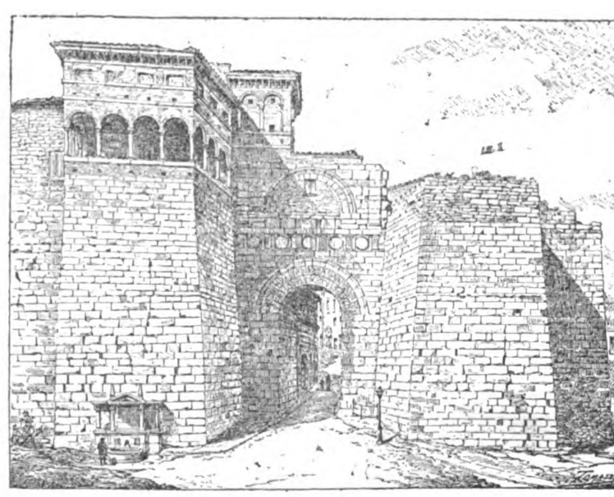


Fig. 5. Gate of Augustus, Perugia.

having one passage for chariots and two for pedestrians, the gate of Fano is worthy of note; and lastly, of gates with two chariot-ways, the most numerous class, we call attention to the gate of Augustus, at Nîmes; the gate of St. Andrew, at Autun; the Porta Nigra, at Treves, etc. The gate of Messene (Figs. 2, 3, 4), of which we give a restoration after Blouet, was built at the same time as the walls themselves (369 B. C.), by Epamniondas. It was this gate that led to Megalopolis, in the time of Pausanias.

[1] From the French of G. Redon, in Planat's *Encyclopédie de l'Architecture et de la Construction.*

Its ruins are well enough preserved to enable us to judge that Blouet's restoration is substantially correct. The towers, only

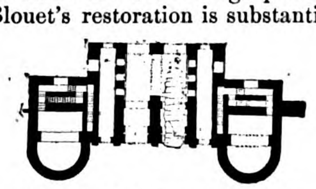


Fig. 6. Gate of Augustus, Nimes.

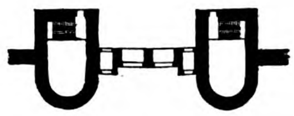


Fig. 8. Saint Andrew's Gate, Autun.

the lower portions of which remain, have been restored after those still entire on the city ramparts.

It will be remarked that here (Fig. 2), as at Mycenæ, the constructors strove to prolong the defence as much as possible. A second gate *C* presented a new barrier to troops that should

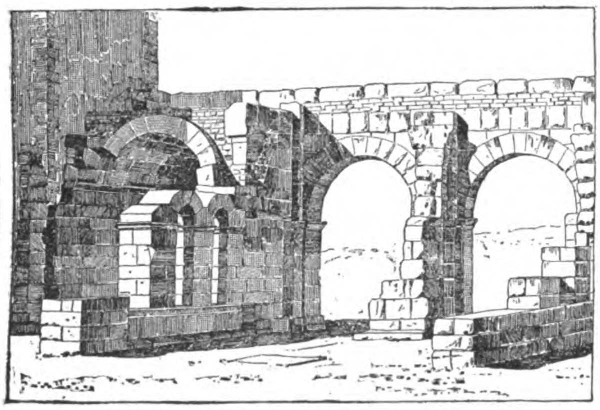


Fig. 7. Gate of Augustus, Nîmes.

succeed in passing the first, and, before reaching it, they would be exposed, in the circular court *B*, to an attack on all sides at once from the besieged stationed on the upper platform. The section (Fig. 3) and the rear façade (Fig. 4), show plainly the composition of this interesting gate.

The Porta Ostiensis, now the Porta S. Paolo, at Rome, is a curious structure of formidable aspect, which already foreshadows certain French gates of the Middle Ages. It was erected by Belisarius when he rebuilt the city wall.

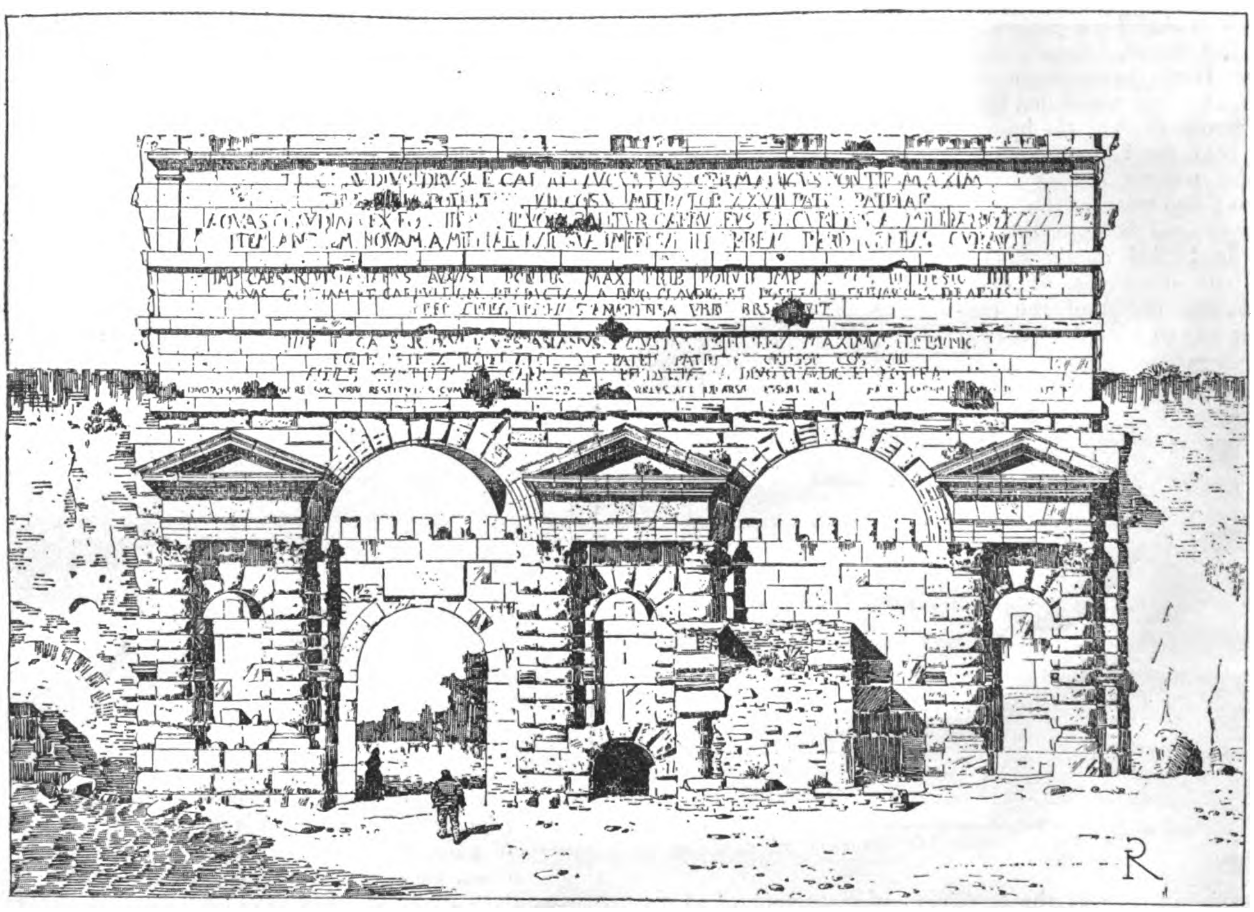


Fig. 11. Porta Maggiore, Rome.

The Porta Marzia of Perugia (Fig. 5), the only gate of the old city now standing, is noted for its fine proportions and for the details of the ordinance with Ionic pilasters above the entrance. The open arcade which overlooks this passage might still be utilized for defensive purposes, if occasion required.

We have mentioned, as an example of gates with one arch and two passages for pedestrians, the gate of Fano, a small town on the shores of the Adriatic; it belongs to the time of

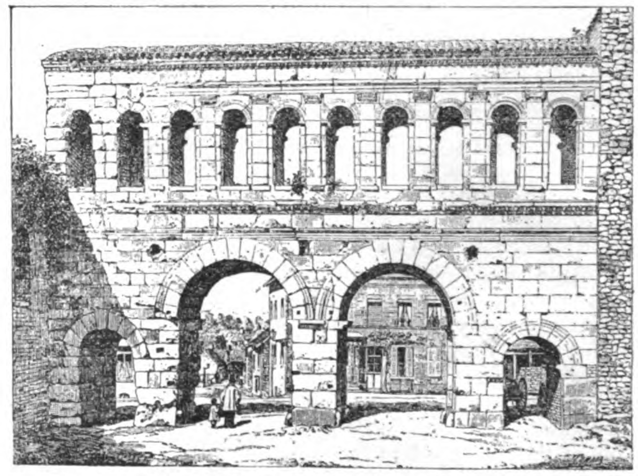


Fig. 9. Saint Andrew's Gate, Autun.

Augustus, who, according to the inscription, caused the place to be walled. This beautiful gate, to-day sadly ruined, is made of Istrian stone.

As specimens of gates with two large arches, the gate of Augustus, at Nîmes (Figs. 6, 7), and the gate of St. Andrew, at Autun (Figs. 8, 9), have been cited. The former constituted a part of the Roman fortifications of the city. It was reared under Augustus in the year 15 B. C. About 1300, Charles V converted it into a fortress, which the Dauphin captured from the Burgundians in 1418. Demolished by the Huguenots in 1570, the stronghold was reduced to a heap of ruins, which the Revolution swept away. In 1848, the gate was restored by M. Questel. The gate of St. Andrew, at

Autun, dating from the fifth century A. D., is in a better state of preservation. It is built of blocks of sandstone laid without mortar. The towers were in rubble-work, revetted with small unhewn stones in the ancient fashion.

The Porta Nigra, at Treves (Fig. 10), is remarkable for its two stories of arches.

Before taking leave of antiquity and turning to French mediæval structures, let us note the peculiar features of the Porta Maggiore, or Arch of Claudius, at Rome (Fig. 11). The aqueducts, as is well known, formed one of the marvels of ancient Rome; there were not less than nine of them, and that of Claudius was one of the finest. When these conduits crossed highways, they were often made to serve as barriers or gates, the arches being utilized for the purpose and converted into genuine motives, which were decorated in a monumental style. The Porta Maggiore, which furnishes an excellent example of such gates, was completed by Claudius, but begun by Caligula. The inscription dates from Vespasian. It is built of travertine.

Most of the ancient city gates bear a close resemblance to one another; they were nearly all on the same general plan; they were usually surmounted by a corridor, with arches pierced entirely through, so that the defenders could sustain an attack when necessary. This passage connected with that of the curtains. The towers in all cases projected prominently, and contained the stairways establishing communication with the story or stories serving as defences, which generally existed.

Upon the whole, the builders of antiquity — especially among the Romans, who were more apt to be the invaders than the invaded — in the construction of these gates seem to have devoted as much thought to the opening of ample passages for traffic, and to making a powerful impression upon strangers entering their cities by means of a decorative display indicative of the genius of the people, as to dispositions for their protection against a future invasion, which was hardly to be expected. For this reason, although all sorts of defensive works were thrown up in times of siege in front of the gates, it may be conceived that the latter were too inadequately covered and closed to withstand a regular, well-directed attack. The arrival of the Barbarians led, necessarily, to very important modifications in their construction. In fact, in the Gallo-Roman period, when the wild hordes from the northeast swept

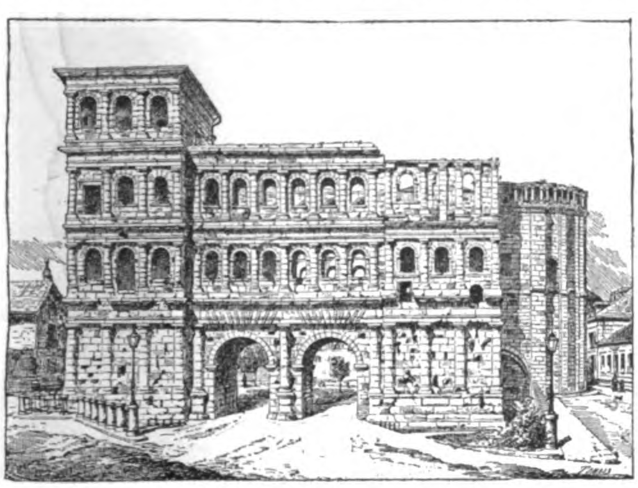


Fig. 10. Porta Nigra, Treves.

down upon the Gaulish territory, the city gate suddenly lost the character that it had hitherto maintained, a character analogous to that discussed above. The decorative element was relegated to a secondary place, and the defensive predominated to the exclusion of almost every other consideration.

[To be continued.]

CANADIAN PATENTS. — In 1892 there were granted a total of 3,471 Canadian patents, of which 2,227 were taken by American citizens, 671 by Canadians, 298 by Englishmen, 106 by Germans, 26 by Frenchmen and 89 by persons of other nationalities. It will thus be seen that nearly two-thirds of all the patents granted in Canada are to American inventors. It may be said that American inventors chiefly support the Canadian Patent-office. — *Invention.*

OFFICE-HELP FOR ARCHITECTS.[1] — XVI.

Gateway to a Bohemian Farmhouse. From *Architektonische Rundschau.*

SECTION III. — METAL TRUSSES:

§ 239. Types: — Metal trusses may be any of those shown in Chapter II.

§ 240. Proportioning: — See Chapter VI, Section I and Chapter II.

§ 241. Details: — Pin-connected trusses, small trusses for skylights, open ceilings and the like should have the tension-members of rods or small plates connected with each other and with the compression-members by pins. The compression-members should be made of channels or plates and Ls in pairs, with a cover-plate where necessary. Sometimes for very light trusses Ls may be used. Joints in compression-members should be made with fish-plates; joints between compression and tension members should be made with a plate and pin. Where the end of a post is too small to make an eye of proper size, plates should be riveted onto it to make the eye. Connections of floors to the lower chords should be made with hangers from the pins. Connections to the top chords should be made with shapes, Ls, plates, channels, etc., so arranged as to facilitate the use of the connecting plates (Fig. 65). All of the connections should have the lines through the centres of gravity of the several pieces intersecting in a common point. The length and thickness of the plates at a joint will be determined from the strains existing around the joint, and from the size necessary to give a sufficient bearing-value on the pin. The compression-members of trusses have so small an r that the safe fibre-strains are reduced much below the S_c of the general Table, and may be only one-third of that allowed on the pin. Where the thickness of the bearing-plates exceeds twice the thickness of the web of the compression-member, at least one of the bearing-plates must be made with flanges similar to the compression-member, and the rivets needed distributed over the flanges as well as the web, using the cover-plate to connect the flanges together. Where the tension-members are of good size, they should be made $\frac{1}{2}''$ thick and in two parts so as to make the grouping around the pin uniform, keeping the bending-moments on the pin a minimum. For size of pins for bending-moments, see Table XXII. All

[1] By George Hill, Consulting Engineer. Continued from No. 919, page 84.

ABBREVIATIONS AND SYMBOLS.

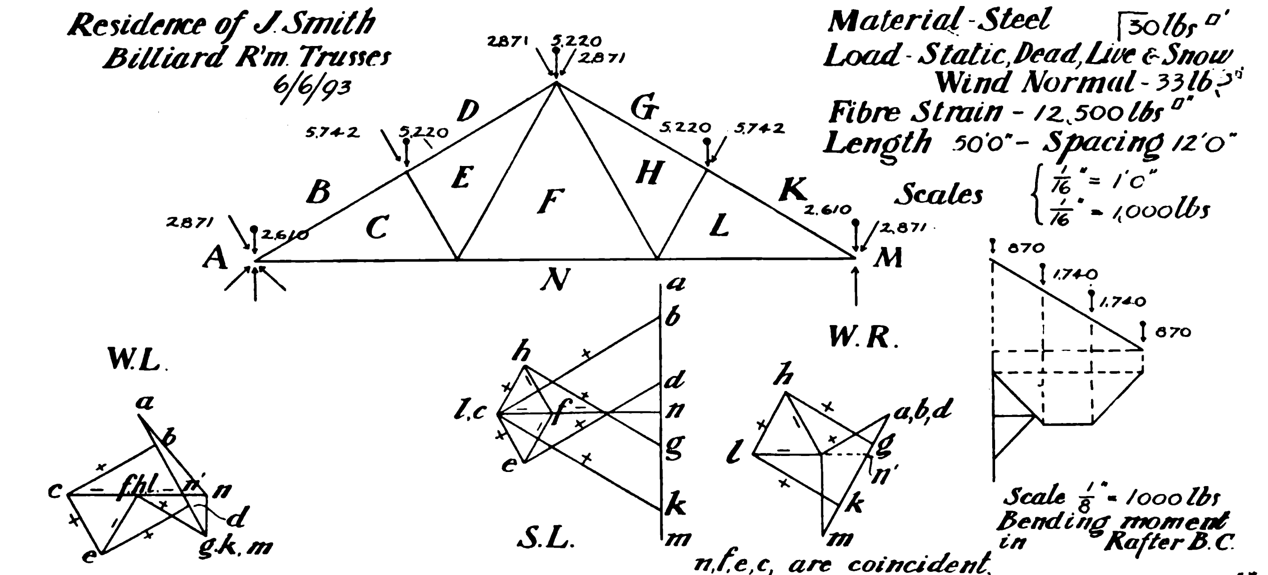
$=$ equal to.	$\therefore$ therefore.
$\parallel$ parallel to.	$\square'$ square feet.
$\div$ divided by.	$\square''$ square inches.
$\times$ multiplied by.	8* read 8 pounds per lineal foot.
$+$ added to.	[channel bar.
a^2 a multiplied by itself.	I I-beam.
$a > b$: — a greater than b.	T T-iron.
$a < b$: — a less than b.	L angle iron.
$\frac{a}{b}$: — a divided by b.	⊥ deck beam.
	● round section.

I ton $=$ 2,000 pounds as this is the conventional ton, the legal ton is 2,240 pounds, but is rarely used.
$l =$ the length between supports of any beam or girder or height of any column, always in feet.
$b =$ breadth of any beam or girder, always in inches.
$d =$ depth of any beam or girder, or the least transverse dimension of any column, always in inches.
$L =$ total load uniformly distributed coming on any piece in pounds.
$L^{\square'} =$ " " " " per square foot in pounds.
$W =$ concentrated load on any piece in pounds.
$s =$ span of any arch or truss between centres of end pins in feet, or spread of footing courses.
$A =$ area of any section in square inches.
$M =$ maximum bending-moment in inch pounds.
$n =$ distance of centre of gravity of section from either top or bottom edge in inches.
$I =$ moment of inertia, neutral axis through centre of gravity.
$R =$ moment of resistance of section.
$r =$ radius of gyration, in inches.
$Sc =$ safe compressive strain in pounds per square inch.
$St =$ " tensile " " " " " "
$Ss =$ " shearing " " " " " "
$S =$ strain per square inch in extreme fibre.
$P_e =$ upward reaction of support at left-hand end of beam.
$P_f =$ " " " " " right " " " "
$e =$ distance of centre of gravity of load from left hand of beam.
$f =$ " " " " " " " " right " " "

diagonal and a few of the bottom tension-members should have turn-buckles (Table XXIII) in them to bring an initial strain on all of the parts when the truss is set up. All pin-holes should be punched and reamed true to 0.01″, when the metal is less than $\frac{5}{8}''$ thick, and drilled for all greater thicknesses. The pins should be true to 0.01″ and should have large hexagon-head nuts. Connections should be made either with eye-bars (Table XXIV), or clevis nuts (Table XXV).

the upper plate should have a lip to keep out the dust, keep in the rollers and protect the lower one. (Fig. 66). Between the plates should be placed hard steel rollers of from 1″ to 2″ in diameter and of an aggregate length equal to 6″ of bearing for each 10′ 0″ of span of the truss. The sliding-shoe is usually held on the wall sufficiently by friction, but if the truss is very light it may be anchored with a couple of $1\frac{1}{4}''$ bolts.

In Figure 65, the compression in $B\ C$ would indicate some-



SCHEDULE.

$M = 1.740^{\#} \times 50'' = 87,000''^{\#}$

Piece	S.L. +	S.L. −	W.L. +	W.L. −	W.R. +	W.R. −	Misc.	Max +	Max −	Sizes
B.C.	15,900		8,400		6,600			24,300		2-5″ [′s 6.5# & 1-6″×¼″ cover, bottom laced.
C.E.	4,600		5,750					10,350		2-4″ [′s 5.5# Laced 2 sides
D.E.	13,200		8,400		6,600			19,800		Same as B.C.
E.F.		4,600		5,750					10,350	1-1½″ ● upset ends clevis nuts.
G.H.	13,200		6,750		8,400			21,600		Same as B.C.
H.F.		4,600				5,900			10,500	" " E.F.
F.L.	4,600				5,750			10,350		" " C.E.
K.L.	15,900		6,750		8,400			24,300		" " B.C.
C.N.		13,700		11,600					25,300	2-Eye bars ½″×4″
F.N.		9,000		5,800					14,800	2- " " ⅜″×4″ Purlin's 3″×2 11/16″×⅜″ Z′s
L.N.		13,700		5,800		5,800			22,500	Same as C.N.

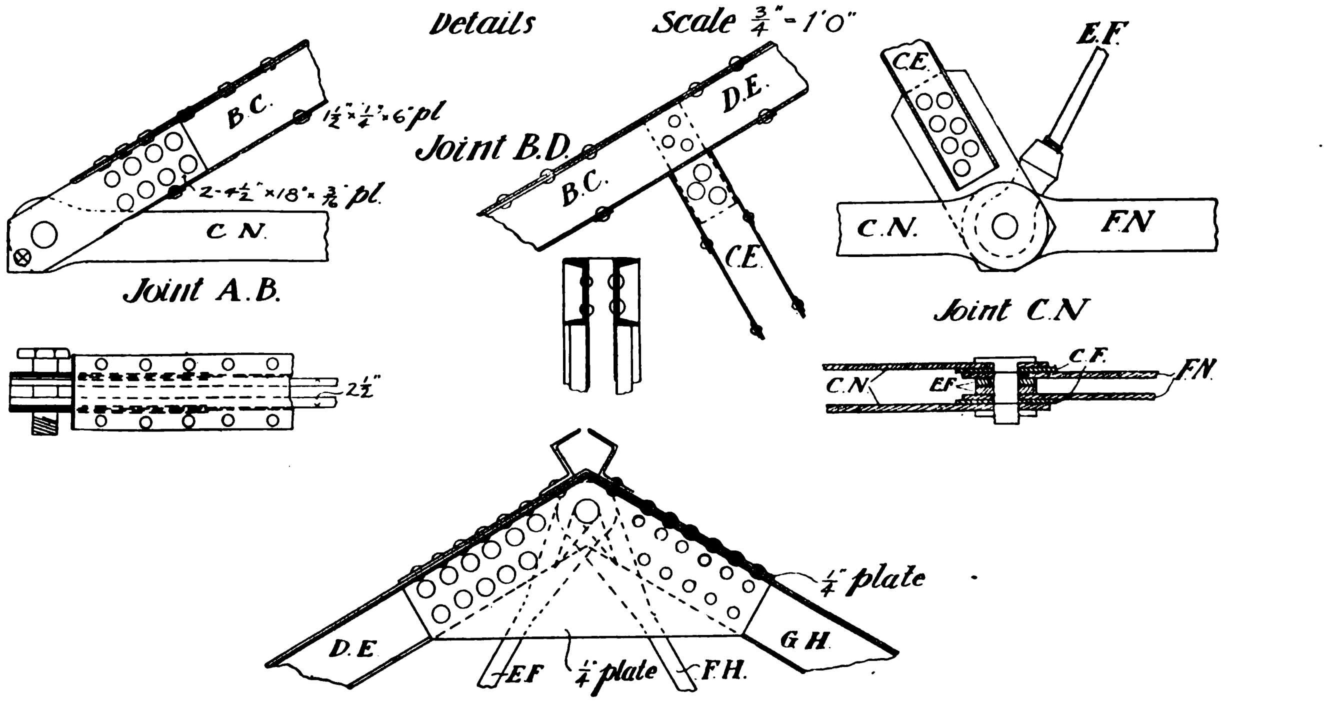


Fig. 65.

The anchor-plates should be so proportioned as to reduce the pressure per square inch put by them on the masonry within safe limits. The expansion-plate should be proportioned in the same way, but it should be made sufficiently long in addition to allow for a change in length of the truss of $1\frac{1}{8}''$ per 100′ 0″. The top surface of the sliding-plate should be planed, as also should the under surface of the upper plate. The lower plate should have a raised lip to hold the oil and

thing like 2 square inches of section needed. The bending-moment in it and in each length of rafter would indicate a moment-of-resistance such as would come from a section of about a 6″ 13# I-beam. Since the compression in the top flange is increased by the bending-moment and the tension in the lower flange decreased, it is probable that something somewhat less, with the upper flange reinforced, would be sufficient. We therefore try two 5″ 6.5# [s. The area of the top and bottom

flange respectively of the two is 1.16 square inches. I will be 1.99, which divided into the length, 14′ 6″ gives a ratio of 7.5, and a safe fibre-strain according to Table XIV of 6,530 pounds. There is then required for compression 3.72

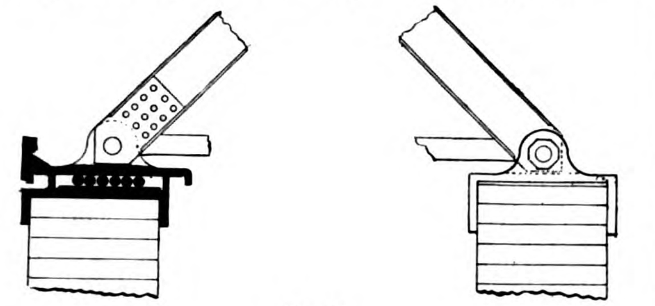


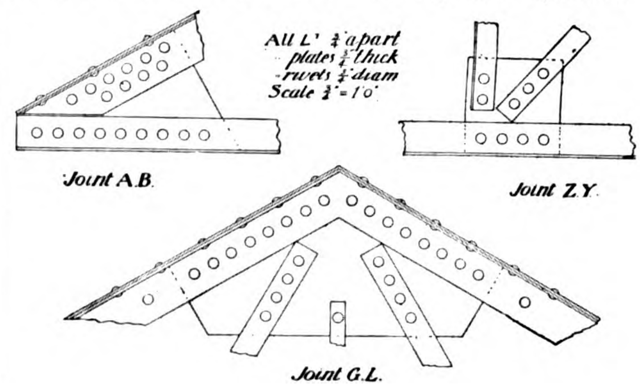
Fig. 66.

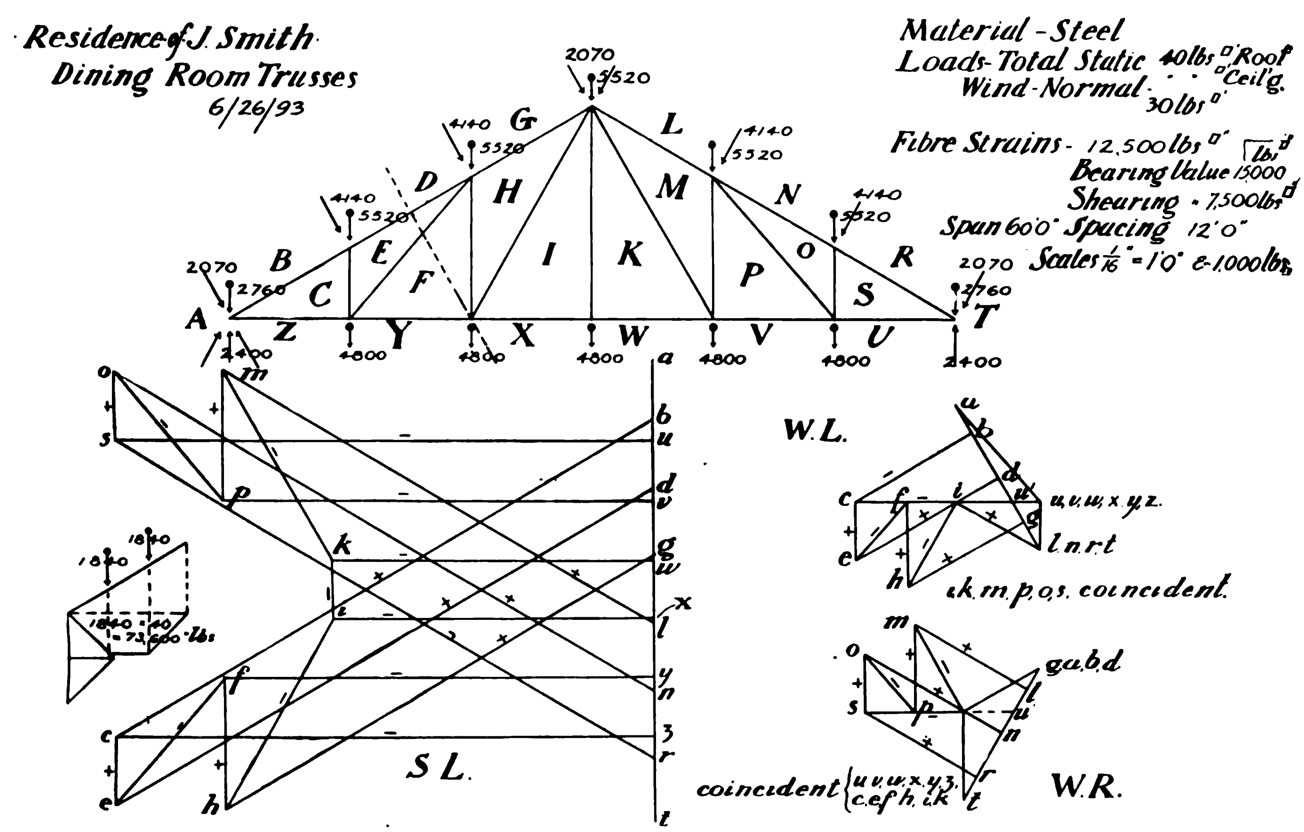
square inches and the combined area of the two [s, gives 3.8 square inches. The required flange-area to resist the bending-moment in this piece is 1.51 square inches. The actual flange-area being 1.16 square inches, if we leave the bottom flange untouched, the compression in it will almost entirely neutralize the tension. On the top flange 1.51 square inches must be added, and we therefore use a flange-plate of 6″ × ¼″. For the bottom, to keep the [s acting in the strongest way, straps are placed across 1½″ × ¼″ × 6″ spaced 18″ centres and riveted up.

For $D\ E$, practically the same conditions hold, the strains would be uneconomical. We therefore use two 4″ 5.5* [s with ½″ plates riveted to each end.

For $C\ N$, standard eye-bars are used. The tension in $C\ N$ requiring 2.22 square inches, the required moment-of-resistance of a rectangular section to carry two men on its centre, as required in § 235, is 1.21 which corresponds with two bars ½″ × 4″. Moment-of-resistance of a bar 2″ × 4″ is 1.33. Therefore if we use two bars ½″ × 4″ one will be slightly stronger than is necessary for the stress, and the other slightly less strong than is necessary for the tension, the combination being sufficient.

For $F\ N$, the section required to take the tension is 1.18 square inches. The moment-of-resistance must be the same as before and we would therefore use two ⅜″ × 4″ eye-bars.





Piece	+ S.L.	–	+ W.L.	–	+ W.R.	–	Misc	+ Max	–	Sizes
B C	51,500		11,200		7,300			62,700		2-6″×4″×3/8″ L's – 8¾″×3/8″ pl.
C Z		44,600		15,200					59,800	2-5″×3½″×⅜″ L's
D E	51,500		13,500		7,300			65,000		Same as B.C.
C E	5,600		5,000					10,600		2-3″×2″×7/32″ L's
E F		13,800		6,500					20,300	2-⅜″×3″ pl.
F Y		35,500		10,800					46,300	Same as C.Z.
G H	41,200		11,000		7,300			52,200		" " B.C.
F H	10,800		7,200					18,000		2-3½″×2½″×¼″ L's
H I		17,800		8,200					26,000	2-⅜″×3½″ pl.
I X		26,600		6,700					33,300	Same as C.Z.
I K		4,800							4,800	2-¼″×2″ pl.
					Purlins 3″×2 11/16″×⅜″ Z's					Make bal. symmetrical

Fig. 67.

all being somewhat lighter; but it is cheaper to carry the rafter through full length, than to change its size.

For $C\ E$, two 2½″ × 1¼″ 4* Ts would do, but it would be difficult to make the connections at each end and it would involve special setting of the rolls to obtain this weight which

For $E\ F$, we would use a 1¼ inch square bar with eye welded at one end and with a clevis nut at the other, this giving us the means for adjustment of the members by the use of slight filler-plates at the joint $B\ D$, if necessary.

Joint $C\ N$ has the various members packed around the pin

completely filling it. If we assume that the pin is held in position by the two parts of $C\,E$ and is strained by $F\,N$ and $C\,F$ we obtain a bending-moment in it of 8,900 inch-pounds, which requires a pin $1\frac{7}{8}''$ in diameter according to Table XXII. We then use $1\frac{7}{8}''$ pins throughout for the connections.

Joint $A\,B$ has a thrust of 24,300 pounds on the pin, requiring the addition of a $\frac{3}{16}''$ plate to the web of each [in order to obtain sufficient bearing area [See Table XXVI].

The chair or anchor shoe should be made of cast-iron with its supports coming closely outside of the [s, and a sleeve should be placed on the pin between the eye-bars $C\,N$ to keep them apart.

The joint $B\,D$ should be made by cutting the [s $C\,E$ square across, riveting a $\frac{1}{4}''$ plate to their back, and riveting these plate to $B\,C$, interposing a plain filler-plate if necessary to secure a firm bearing of $C\,E$ on the rafter.

The joint $C\,N$ would be made by cutting off $C\,E$ and riveting a $\frac{1}{4}''$ bearing-plate on the back, packing the members on the pin as shown in Figure 65.

Joint $D\,G$ would be made by cutting the [s truly to the bevel, making a bearing for them in addition to the pin and then riveting a $\frac{1}{4}''$ connecting-plate to the webs as shown and also a $\frac{1}{4}''$ cover-plate on the top. The members $E\,F$ and $F\,H$ meet on the pin.

Usually each shop has its special methods of detailing and should be permitted to use them, the architects judging of the sufficiency by the example.

§ 242. Details of Riveted Trusses: — All trusses other than those mentioned in § 241 should be framed with Ts, Ls and [s. All connections should be made with a plate or plates placed between the parts to be joined and riveted to them. The number of rivets and the thickness of the plates will be determined the same as in § 241, (Fig. 67). The parts should be separated sufficiently to render access easy for inspection and painting. The riveting should be done usually by means of $\frac{3}{4}''$ rivets with the centre of the holes punched as far as practicable from the edge of the plate and then reamed out.

The pitch of the rivets should never exceed 6″ or sixteen times the thinnest outside plate, and should never be less than three diameters of the rivet. The distance between the edge of the piece and the centre of the rivet-hole must never be less than $1\frac{1}{4}''$ except for members less than $2\frac{1}{2}''$ wide, and when practicable shall be two diameters of the rivet. The diameter of the punched hole should not exceed that of the rivet by more than $\frac{1}{16}''$.

The use of the drift-pin should be restricted to bringing together the parts which form a member, being so lightly driven that the metal about the holes is not distorted. All holes should be made to a snug fit and to within 0.01″ of dimension. Rivets should be put in hot and the heads formed up, using a length of $1\frac{1}{2}$ diameters for the head. Enough pressure must be applied to the rivet to force it into the hole, filling it fully and drawing the parts together. All parts should be so perfectly fitted as to enable all rivets to be placed by hand.

The connecting-plates should be of sufficient size to afford ample bearing-surface for the rivets and area to resist the shear due to the loads. The grouping of the parts of a joint should be made with the axes of all the parts meeting in a common point both longitudinally and transversely so as to avoid any bending-moments in the connecting parts. To accomplish this it will often be desirable to make pieces in two parts, but it is better to do this than to develop a moment in the joint. Rollers for the free end of the truss are necessarily the same as for the pin-connected trusses and should be similarly proportioned. A riveted truss is much stiffer than a pin-connected one but costs more and for exposed work is not so graceful. If a truss is to be exposed to vibration it should always be riveted.

In Figure 67, we have assumed a truss of somewhat larger span supporting a ceiling at the panel points, and give the analysis and detail for it. It will be noted that the diagonals are in tension and the verticals in compression. This is the more economical way for the use of the metal.

The piece $B\,C$ has a compression of 62,700 pounds, and a bending-moment of 73,600 inch-pounds in addition. If a member is made 6″ deep, there will be required a flange-area to withstand this bending-moment of 1.10 square inches. Since the tension in the bottom flange is neutralized by the compression thereon, and since Ls form the shapes most easily connected in a truss of this description, we would try two $6'' \times 4'' \times \frac{3}{8}''$ Ls placed back to back. The safe unit strain, from Table XIV, is 6,840 pounds, which requires an area of 9.15 square inches, the additional area to take the compression in the top flange is 1.1 square inches making a total of 10.25 square inches required in the section. Two Ls give an area of 7.22 and a $8\frac{3}{4}'' \times \frac{3}{8}''$ plate gives an area of 3.26 square inches, making the total 10.48 square inches, and therefore sufficient.

For $C\,Z$, we have a tension of 59,800 pounds requiring an area of 4.78 square inches; to this must be added the area lost by the rivets equivalent to that of two $\frac{3}{4}''$ rivets in a $\frac{3}{8}''$ plate or .56 square inch. We also require an addition to the bottom flange-area, due to the bending-moment caused by two men on the centre, of 0.14 square inch or a total of 5.48 square inches, and this we obtain most nearly with two $5'' \times 3\frac{1}{2}'' \times \frac{3}{8}''$ Ls.

For $C\,E$, if we make the trial of 7,000 pounds safe fibre-strain, we find about 1.5 square inches needed. This requires an r of about 1.00, and this we would obtain from two $3'' \times 2'' \times \frac{7}{32}''$ Ls riveted up $\frac{3}{4}''$ apart.

For $D\,E$, we would continue the Ls of $B\,C$ right through.

For $E\,F$, we have a tension of 20,300 pounds requiring an area of 1.62 square inches, adding .56 square inch for loss in the rivet-holes, we would have a total required section of 2.18 square inches or two plates $\frac{3}{8}'' \times 3''$ each.

For $F\,H$, we have a compression of 18,000 pounds. The length being 11.5′, and r being in the neighborhood of 1, we would have a fibre-strain of 5,700 pounds corresponding to 3.14 square inches. Two $3\frac{1}{2}'' \times 2\frac{1}{2}'' \times \frac{9}{32}''$ Ls give the required area, riveted $\frac{3}{4}''$ apart, and since a considerable fraction of this is wind-pressure occurring only occasionally, $\frac{1}{32}$ can be dropped and the usual $\frac{1}{4}''$ size used. The remaining pieces would be obtained on a similar basis.

For the joints, the joints at $A\,B$ will be made with a $\frac{3}{4}''$ plate, because that is the distance apart that we determined on keeping the Ls, and because the bearing value of the same is slightly in excess of the value of the rivets in double shear.

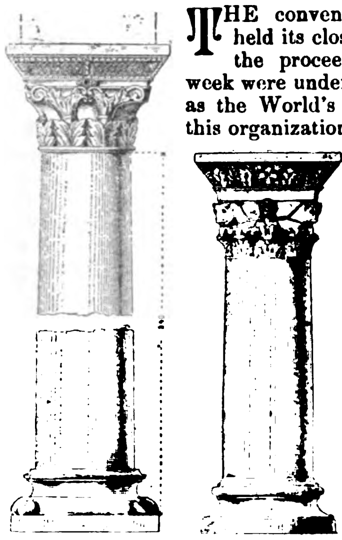
Passing down the rafter, we have a compression of 62,700 pounds which must be transmitted to the plate. Dividing by the shear value of the $\frac{3}{4}''$ rivets, 3,310 pounds, we find 19 rivets required, which, distributed through the two stems of the Ls give 10 rivets. The proportion of the area between the flange and the reinforcing-plate and the stems of the Ls is as 12 is to 30. We would therefore have 25,000 pounds compression in the stems and 37,000 pounds compression in the upper member, and this must be transmitted from the stem to the upper member where the two join, requiring that the rivets should be distributed over a sufficient length of the stem to make the shearing strength of the stem sufficient to transmit this strain. Taking the shear at 7,500 pounds per square inch, we find 5 square inches needed, which is equivalent to 13 inches length along which the rivets are placed. As we actually have a length of 25 inches no trouble need be apprehended.

For the tension-member of this joint, we have 59,800 pounds to transmit, which for the shear value of $\frac{3}{4}''$ rivets in single shear requires 18 rivets, or 9 in each L. The shear between the two members may be taken to be 59,800 pounds, which at 7,500 pounds requires 8 square inches, and this divided by the thickness of the plate, would call for a plate 11 inches long. As the plate along its least dimension is 25 inches, we have ample. A similar course of reasoning applies to the determination of the sizes in the other joints.

(To be continued.)

IMPROVING THE SANITATION OF NAPLES. — A report that has just been published gives an account of the work that has been done by the Society for the Sanitation of Naples. From this it appears that the sum of £262,546 was spent during 1892 on the expropriation of property required for the improvements of the new quarters, which, added to the expenditure under this head in previous years, brings the total to £1,782,646. In the lower sections of the town 23,373 square metres of houses have been demolished, the total space cleared since 1889 being 123,528 square metres. On the other hand, 19,864 square metres of new buildings have been erected in the east end of the town, making a total of 86,665 square metres since the beginning of the Society's operations, exclusive of 87,886 square metres of dwellings for the poorer classes. No less than 27,194 inhabitants have been evicted from the demolished quarters since 1889, and of these 14,590 are occupying the new dwellings. In the work of the new drainage system in connection with the sanitation scheme, considerable progress is reported, more than one-third of the whole project having been executed. — *New York Evening Post.*

THE WORLD'S CONGRESS OF ARCHITECTS.


Capitals from the Church at Rasdorf. From *Zeitschrift für Bauwesen.*

THE convention of the American Institute held its closing session on August 1, and all the proceedings of the remainder of the week were under the auspices of what was known as the World's Congress of Architects. While this organization was entirely without any official relationship with the Institute, yet, from the commencement of its work, the committee realized that it could only advantageously and successfully work with the coöperation of the American Institute of Architects and with the various foreign architectural societies. Accordingly much of the work of organization and arrangement was worked up conjointly with the committee of the Congress and the convention committee of the Institute.

Correspondence was entered upon with the executive officers of all important foreign and local architectural societies, asking their official aid and inviting them to be present themselves, if possible, and to urge their members to make the trip to Chicago. Also they were requested to arrange, if possible, to obtain from their members a few short papers upon matters of general interest to the profession. Very numerous responses were received, and the following permitted the use of their names as the Advisory Board:

ADVISORY COUNCIL OF THE WORLD'S CONGRESS OF ARCHITECTS, AT CHICAGO.

FOREIGN MEMBERS.

Charles Garnier, Member of the Institute of France; George Soudon Bridgman, M. S. A., Delegate from the Society of Architects, London; M. Daumet, President of the Central Society of France, Member of the Institute of France; E. Salomons, F. R. I. B. A., President Manchester Society of Architects, England; M. Guadet, First Vice-president of the Central Society of Architects of France, Professor at School of Fine Arts; Charles Lucas, Member of the Central Society of Architects of France; W. Arthur Heazell, President Nottingham Architectural Society, England; F. Adolphe Bocage, Member Central Society of Architects of France; J. Macvicar Anderson, President Royal Institute of British Architects; William Emerson, Honorable Secretary R. I. B. A., London; Josiah Conder, F. R. I. B. A., Member of the Society of Japanese Architects, Tokio, Japan; Mariano Belmas, Director of the Department of Public Works, Madrid, Spain; Tatsuzo Soné, Special Representative of the Society of Japanese Architects, Tokio, Japan; M. Pangoy, President; M. De Foucauet, First Vice-president; M. Buyron, Second Vice-president; M. Reybaud, Secretary of the Society of Architects of Marseilles, France; Robert Walker, President of the Society of Architects, London; C. O. Glein, Member of the Association of German Architects; Herr Hinckeldyn, Chief Government Architect, Berlin; John Bobula, jor., Delegate of the Hungarian Government and Commerce; H. Ende, Government Architect, Berlin, Germany; Giuseppe Toggi, Italy; the Presidents of the Architectural Societies.

UNITED STATES MEMBERS.

Edward H. Kendall, President of the American Institute of Architects; Alfred Stone, Secretary of the American Institute of Architects; the members of the Committee on Foreign Correspondence of the American Institute of Architects, Richard M. Hunt, Chairman; the Presidents of State and Local Chapters of the American Institute of Architects.

As a result among the papers obtained were two from England, two from France and one from Japan, as well as a large number from the United States, several of which were originally written for presentation at the convention itself, but later, upon further consultation of the two committees it was deemed best, that they, too, should be read at the Congress, really making the convention this year to consist mainly of the necessary routine work.

The weather during the greatest part of the week has been as near perfection as possible, and it is a very great pity that many of the architects have (according to their own letters) thought September a more agreeable month for them to visit Chicago and the Exposition, and made all their plans accordingly, and could not afford two trips; it is only to be hoped that for their own comfort they do not strike our "hot spell," which generally comes in September for a short time, and is the most uncomfortable period of the whole season. As a result of this, the attendance both at the Convention and the Congress has not been nearly so large as hoped for, and as a desire to keep up the *esprit de corps* of the profession should have brought together. The attendance at the Congress was decidedly variable as to numbers, the latter part of the week showing smaller audiences than at the first, much of which was plainly due to the fact of the very strong attractions of the White City, and the hope that the papers delivered could hereafter be read at leisure.

The Congress was opened by Mr. Burnham, as chairman of the committee, with the hall crowded with fully two hundred persons, — many of them standing. In a neat little address he expressed the idea that the presidency of this Congress should be in the hands of the man recognized by the American Institute of Architects as its official head, and, therefore, requested Mr. Kendall to thereafter fill that office, which he did, with the exception of those times when he called the distinguished representatives either of local Chapters or foreign societies to take his place. As a whole, the papers were of decidedly unusual interest, but many of them were so strictly technical with a large admixture of engineering data that the mere hearing of them read was not entirely satisfactory. In fact one wanted to sit down to them seriously and compare them with other authorities, and other data. All of the papers will be eventually published by the World's Fair Auxiliary, but unfortunately none of them were printed beforehand so as to permit of their being handed around.

The various papers on the Columbian Exposition probably evoked most general interest, and although they were necessarily filled with figures, yet the results so near at hand caused them all to be interesting.

M. Guadet's paper on "Public Competition," was read by M. Bocage of Paris, and while giving the general facts of the French system of competitions, yet suggested numerous ways in which it might be bettered, both for the profession and for the good of the client. Mr. Van Brunt's scholarly paper upon "The style that is gradually being developed by the ready adaptation of American architects to the modern requirements of buildings, and new systems of construction," was one of the pleasantest contributions read on the third day of the Congress.

During the entire Congress, one very noticeable feature was the large proportion of women present. Many of them were evidently wives and daughters of attending architects, but also there were numbers who simply came in and stayed during one or two papers and then left.

On Wednesday evening the visiting architects, with ladies, had a very enjoyable excursion on the lake for several hours, at the invitation of the Illinois Chapter. The view of the grounds and fireworks from the lake was the principal object of the trip.

The last day of the Congress had several quite noticeable papers, and the attendance was again fairly good. Mr. Sullivan's paper upon "Polychromatic Treatment of Architecture" (he, himself, in his remarks denominated it the "Psychological facts underlying architectural design") was followed by an extremely interesting talk from him upon the development of the ornamental from geometrical forms, and then finally their treatment in color, all illustrated by sketches and designs showing the peculiar methods of study by which Mr. Sullivan has arrived at some of his charming and unique schemes of decoration.

Mr. Soné, member of the Society of Japanese Architects, read Mr. Conder's paper upon "The Conditions of Architecture in Japan," postponed from Wednesday.

During the Congress, several papers were read by the Secretary for authors who were not present, and it frequently was necessary to change the order of exercises from that shown on the schedule.

Altogether the Congress has brought out a most valuable collection of papers, but their full worth will not be appreciated until they have been printed in full, and read at leisure, with necessary care and thought. While but few of the papers were too long in themselves for the proper treatment of the subjects discussed, yet when combined in number, even the most entertaining series became fatiguing from the very care and attention necessary to properly digest them. Personally, I think the Congress would have been more uniformly entertaining and more attractive if the number of papers *read* had been very materially reduced and all others *filed* for printing. The World's Exposition, with charming weather, was too great an attraction, and to keep and hold any great body of men day after day away from it was impossible. However, the Congress undoubtedly has done very considerable, and will do still more, towards making future meetings possible and profitable.

At the same time with the Architects' Congress, there have been running along in the Art Institute a series of other congresses upon art subjects, ceramics, photography, painting, sculpture and decorative art. This latter had several interesting meetings, notably the one in which Mr. Choya, the Japanese imperial representative, read a paper upon "Japanese Decorative Art," likening it to the sun (the national emblem) which was rising and now throwing its light over the entire world.

CORRECTIONS. — In our issue of May 27, 1893, in article on "Commemorative Monuments" on page 127 for "Column of Alexandria" read "Column of Alexander," and on page 128, for height of Column of Lima, read, "The total height is 21m. 40," the figures 7m. 40 given really represent the diameter of the platform.

ABSTRACT OF CHAPTER REPORTS PRESENTED AT THE TWENTY-SEVENTH ANNUAL CONVENTION, A. I. A.

Gateway to a Bohemian Farmhouse. From *Architektonische Rundschau.*

NEW YORK.

(*Chartered by A. I. A., March* 19, 1867.)

PAPER by Mr. De Lemos, on a trip to Norway and Denmark.

Special committee appointed, and in coöperation with other societies in New York, urged the preservation of the present New York City-hall.

Correspondence with the Ontario Association of Architects with reference to the licensing of architects.

Correspondence with reference to compensation for professional service, showing its good effect in several cases.

With reference to the publication of the *Proceedings* of the twenty-sixth annual convention of the A. I. A., and recommending confining the editing of future proceedings to the Secretary of the A. I. A., or a competent delegate nominated by him.

Expressing a wish to have a proper history of the Institute and its Chapters and kindred societies prepared by Mr. A. J. Bloor, and published at the expense of the Institute.

Declining representation or participation in the proposed Congress of Architects.

Postponing to another year the consideration of a plan to affiliate with the Architectural League of New York.

The report also gives, in quite full detail, the happy results of the work of the Willard Commission and the use of the collection by the students of the class in architecture in the Metropolitan Museum of Art, and those in Columbia College.

The financial condition of the Chapter is good and it is recommended by the Secretary that delegates from the various Chapters have an opportunity to receive the substance of the Chapter reports, with a view to comparison and possible improvement of regimen.

ILLINOIS.

(*Chartered previous to October* 9, 1871.)

Founded before the great fire, the first record in its minute-book is: "The records of the Chapter, together with the charter and all documents and papers, were destroyed by fire, October 9, 1871."

Chapter has been honored by the selection of a number of its members to design some of the principal buildings of the Columbian Exposition, and by a selection from its members of persons to revise the building ordinances.

Financial condition good. The Institute of Building Arts, where its meetings are held, is under the care of the Chapter.

Four papers have been read before it.

1. E. L. Ransome, on Twisted Iron Applied to Concrete Flooring in Buildings.
2. D. Adler, on Piles for Foundations.
3. F. Bauman, on Effect of Frost upon Buildings and Foundations.
4. R. Guastavino, on The Spanish Tile Arch.

PHILADELPHIA.

(*Chartered November* 14, 1869.)

No Report.

BOSTON.

(*Organized May* 22, 1867. *Chartered* 1870.)

Papers have been read before the Chapter as follows:

1. Mr. Partridge, account of his trip to Europe as a Rotch Travelling-scholar.
2. Messrs. Preston and Ware, an account of the twenty-sixth annual convention in Chicago and the World's Fair buildings.
3. G. L. Heins, an exhibition and explanation of the drawings of Heins & La Farge for the Cathedral of St. John the Divine.
4. R. A. Cram, "The Question of Style in Ecclesiastical Architecture."
5. R. C. Sturgis, "The Special Charm of English Architecture," illustrated by stereopticon, water-colors and prints.
6. W. P. P. Longfellow, on Bramante, illustrated by photographs.
7. W. R. Emerson, on his impressions of recent architecture in Europe.

The Chapter instituted a competition on the treatment of Copley Square, with gratifying results, and there is a strong hope that the square will receive adequate treatment by the City Government.

It also assisted in the selection of a Rotch Travelling-scholar, and W. H. Kilham was selected.

It mourns the loss by death of George Snell, a native of England and a member of the Chapter since 1875.

In good financial condition.

CINCINNATI.

(*Chartered January* 25, 1870.)

The Chapter has held monthly meetings, and in connection with its annual meetings a banquet, which has added much to its interest.

BALTIMORE.

(*Chartered December* 10, 1870.)

The Chapter has been requested by the Building Committee of the new court house, to name three architects as professional advisers, to assist in determining the award of prizes in the competition for the same. The Chapter selected Messrs. D. H. Burnham, Edward H. Kendall and E. M. Wheelright.

RHODE ISLAND.

(*Chartered May* 10, 1875.)

The Chapter investigated a question which arose in regard to award of competition for Rhode Island State Building and approved the action of the Building Committee.

The Chapter has offered prizes for the best drawings of Classic work executed in the State prior to 1840, open to all draughtsmen of both sexes, with a view to preserving a record of the work still in existence, and as an incentive to original research and drawing from executed work.

It also has under consideration an exhibition of internal decorative work and furnishings.

SAN FRANCISCO.

(*Founded May,* 1881. *Chartered May,* 1882.)

The Chapter unsuccessfully attempted to secure the passage by the last legislature of a law regulating the practice of architecture.

It maintains classes in drawing and modelling for the benefit of students from the offices of its members, under the care of its President, Mr. George H. Sanders, who by his interest and exertion has been able to secure satisfactory and encouraging results.

INDIANAPOLIS.

(*Chartered February* 2, 1886.)

No report.

WASHINGTON.

(*Chartered September* 21, 1887.)

The Chapter has held regular monthly meetings in its own Chapter-rooms, and its financial condition is excellent.

BUFFALO.

No report.

ST. LOUIS.

(*Chartered March* 8, 1890.)

The Chapter has held monthly meetings, preceded by a lunch. Nothing of special importance to report, except that the. Chapter is beginning to wield an important influence in public matters, and has published a code of ethics to govern general practice, as well as competitions of high professional standard.

The Chapter has been called upon to mourn the loss by death of P. P. Furber, who was also a member of the Board of Directors of the A. I. A., in the fortieth year of his age.

KANSAS CITY.

(*Organized October* 12, 1890.)

The Chapter has had a year of enthusiastic interest, has held eighteen meetings, at which important subjects relating to the profession and to the community where it is located have been discussed and has also taken a lively interest in the efforts to secure national legislation in regard to the designing of United States Government Buildings, and is ready to coöperate in any movement to secure a fair trial of the law which has been enacted.

WESTERN PENNSYLVANIA.

(*Organized March* 28, 1891.)

Has held five regular meetings. In good financial condition.

WISCONSIN.

(*Chartered September* 16, 1891.)

No Report.

OHIO.

(*Chartered September* 17, 1891.)

The Chapter to whom was entrusted the selection of an architect for the Ohio State Building at the Columbian Exposition, selected, unanimously, James W. McLaughlin.

The membership being distributed throughout the State, only annual meetings are held.

WESTERN NEW YORK.

(*Organized October* 29, 1887. *Chartered December* 5, 1891.)

Has forty-four Regular and six Honorary Members.

WORCESTER.

(*Chartered January* 26, 1892.)

Has regular monthly meetings from October to June, at which papers are read and discussions take place on topics of interest, and a lunch is served.

The Chapter is in consultation with the city officials relative to a revision of the building ordinance.

Two members have died during the year, Frank L. Wheeler and John B. Woodworth.

There is a movement on foot to increase membership by extending its limits to other and neighboring towns and cities.

SOUTHERN.

(*Organized February* 17, 1892.)

Extended in its territory it has had but few meetings, and at its annual meeting on January 10, twenty-four new members were enrolled, making a total membership of fifty-eight, ten of whom are members of the A. I. A.

MINNESOTA.

(*Organized February* 20, 1892.)

The year of 1892 was one of organization. The Chapter has a goodly number of members and is in good financial condition. The lack of enthusiasm before spoken of has diminished, and monthly meetings have been held. Papers of interest have been read, and competitions on twelve subjects among the draughtsmen, have been adjudged.

COLORADO.

(*Organized March* 27, 1892.)

The Chapter has taken an active part in regard to a lien law, and one licensing architects. The former was enacted, but the latter met the fate which has attended all similar efforts elsewhere. It is now considering a revision of the Denver City Building Ordinance, in coöperation with the Inspector of Buildings.

CLEVELAND.

The Chapter has held eight meetings, and informally discussed topics of architectural and professional interest.

MICHIGAN.

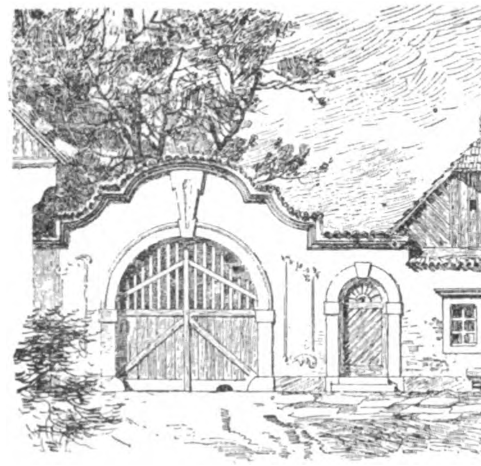
Holds monthly meetings and has done good work in the interest of the profession, preventing, by its influence, all local architects, both members and non-members, from entertaining a competition for a building to cost $350,000, because of the unworthiness of the conditions.

IOWA.

There has been a strenuous effort made by Eugene H. Taylor, the last President of the Chapter, to awaken interest and revive and keep alive the old Chapter, but the distances are so great and the number of architects in the State so small, it has not been possible to make any marked progress. It is, however, hoped that it is only a case of suspended animation, and that before long we shall have a report from a flourishing Iowa Chapter.

A Tale of Deceit. — The famous Farnesina Palace, at Rome, was originally built for Agostino Chigi, the wealthy banker of Pope Leo X, who, as the story goes, after a banquet that he gave there in honor of His Holiness, had the gold plate that was used at the entertainment flung into the Tiber in the Pope's presence, exclaiming that no one else should be permitted to use plate that had been eaten from by the Holy Father. The wily old banker had, however, taken the precaution of skilfully concealing a net in the river, so that after the Pope's departure he was able to recover his plate, which is still in the possession of the now princely house of Chigi. — *New York Tribune.*

MR. BURNHAM'S ADDRESS BEFORE THE WORLD'S CONGRESS OF ARCHITECTS.



Gateway to a Bohemian Farmhouse. From *Architektonische Rundschau.*

I DO not know who first advocated the holding of a World's Fair on the four hundredth anniversary of the discovery of America by Columbus, but by the summer of 1889, New York, Washington, St. Louis and Chicago had organizations at work, each in the interests of its city. The one in Chicago started to raise money by subscription. It sent a well-known railway manager, Mr. E. T. Jeffery, and an engineer, Mr. Chanute, to examine and report regarding the French Universal Exposition then being held in Paris. It also elected a committee to report on sites and this committee invited the writer to consult with them, which he did during the fall of 1889 and the winter following. Very little was accomplished, as the chief interest then centered in the contest before Congress by the cities interested in securing from the Government the location of the Exposition; but on April 9, 1890, the State of Illinois licensed the corporation, since known as the "World's Columbian Exposition," and on April 25th of the same year, the National Congress passed an Act naming this city as the one within whose limits the Fair was to be held.

The Act of Congress provided for a national body, to be known as the "World's Columbian Commission," to which was entrusted the custody and care of exhibits and all communications with foreigners and exhibitors, and it also provided for the local corporation I have mentioned, to which was entrusted the designing and building of the Exposition, and the custody and care of it to the end of the Fair.

The National Commission organized and elected a president, a secretary and a director-general. The Illinois corporation also organized and elected a president and secretary and appointed various committees; among them that of grounds and buildings.

For the rest of the spring and during the first two summer months much time was wasted over the question of a site in Chicago; various committees from the Corporation, the National Commission, the City Authorities and the Illinois Central Railroad, being engaged in the discussions, with little hope of a settlement. On August 20th, however, the first real step in the right direction was taken, and the local corporation then retained as Consulting Landscape Architects, the firm of F. L. Olmsted & Co., of Brookline, Mass. On September 2d, thirteen days afterward, Mr. A. Gottlieb was appointed Consulting Engineer, and Messrs. Burnham & Root, Consulting Architects. In the following October, Messrs. Burnham & Root resigned, Mr. Root then being elected Consulting Architect, and the writer being made Chief of Construction, all at one meeting.

These officers reported to the Grounds and Building Committee, which had "jurisdiction in all matters pertaining to grounds, leases, engineering, designs, plans, construction of buildings and works, maintenance of buildings and grounds; organization of guards, police, detective and fire-departments, gas, electric-lights, water-supply, medical service, application for space, telegraphy, insurance, etc." The Chief of Construction was made the Executive Officer of the Committee and the Consulting Architect, Landscape Architects and Engineers were ordered to report to him.

Early in the fall of 1890 the two controlling bodies selected Jackson Park and the down-town Lake Front as what was called the "Dual Site," it being stipulated that the Fine Arts Building, the Liberal Arts Building and the Music Hall should be kept "down-town," and all other buildings be in Jackson Park. This decision was reached after a careful report by Olmsted & Co. of all the sites tendered, and upon the advice of all the members of the Consulting Board.

The South Park Commission leased Jackson Park and Midway Plaisance to the World's Columbian Exposition and it was agreed between the parties:

1. That the grounds should be cleared of all buildings and turned back to the Commission on or before a certain date.

2. That improvements made by the Exposition were to be as far as possible in the direction of the permanent improvement of the Park.

The original designs of the South Park were made by Mr. Frederick Law Olmsted and Mr. Calvert Vaux, about 1870. When, therefore, we took up the study of the grounds for the purpose of devising a plan for the Exposition, Mr. Olmsted's familiarity with the site, and his superior knowledge of landscape effects caused us to be guided by him in general features. Mr. Codman, his partner,

was a man well trained in all matters relating to the setting and surroundings of buildings. His training, both here and in France, his extensive travel, knowledge and natural aptitude fitted him to be both adviser and executant in this important work.

The general scheme of land and water was suggested by Mr. Codman. The arrangement of the terraces, bridges and landings was suggested by Mr. Codman after the Architectural Board had adopted a style for the Grand Court. The size and number of the Exposition buildings proper was determined from the schedule made by the Classification Committee, the order of the chairman of the Building Committee being to plan for structures covering about one-third more area than those in Paris in 1889. The shape and disposition of the buildings was determined by Mr. Root and myself, the engineer, Mr. Gottlieb, being, of course, consulted as well. While I mention the particular part in which each led, it is true that all of us consulted together on questions that arose, and nothing was finally determined upon which did not have the approval of all. Several tentative plans were rudely drawn on the cross-sectioned lithographed maps of Jackson Park, and a final one early in December, 1890, which was then adopted by the National Commission and the Illinois Corporation as the plan of the Exposition, though it only dealt with buildings immediately around the Grand Court, the Horticultural, Fisheries and the Government space. This plan made no provision for State, Foreign or Woman's Buildings, for the Midway Plaisance, or the structures south of Machinery Hall and Agricultural Building. It was a suggestion, and it was not intended by us to present more than the mere central idea for the parts of the scheme then treated of. There was nothing original in it, except the introduction of the canal, the lagoons and wooded island, the Grand Court being the same arrangement as at Paris, with a water-basin in the centre and a dome at one end, in front of which was to be the great fountain. The plan was the work of us all. It was not due to an inspiration, but it was thought out logically, step by step, keeping in view the immediate purposes of the Exposition and the final treatment of the ground as a public park. It was a crude outline, without suggestion of architectural treatment or style. In fact, nothing was done or said as to the architecture proper, except idly and in a desultory way, Mr. Root at that time leaning to variety in style and color for the buildings of the Fair. On December 1, 1890, the status was as follows:

The Exposition was to be built on two sites, seven miles apart, and a sketch-plan for part of one of them had been officially adopted. It was necessary to take charge of nearly 700 acres of land, the larger part of which was swampy, to design and build the Exposition and place the exhibits in two years and five months.

For this purpose, it was necessary to quickly organize a competent force of architects, sculptors, painters, engineers, police, firemen, business men and clerks. Every moment was precious. It was out of the question for the firm of Burnham & Root to think of designing all or any part of the buildings, because of the relations its members had already assumed toward the enterprise. I therefore drew up the following memorial to the Grounds and Buildings Committee, which my *confrères* signed at my request. It was sent December 9, 1890, to the Committee on Grounds and Buildings.

"Preliminary work in locating buildings, in determining their general areas, and in other elementary directions necessary to proper progress in the design and erection of the structures of the Columbian Exposition has now reached a point where it becomes necessary to determine a method by which designs for these buildings shall be obtained.

"We recognize that your action in the matter will be of great importance, not only in its direct effect upon the artistic and commercial success of the Exposition, but scarcely less upon the aspect presented by America to the world, and also as a precedent for future procedure in the country by the Government, by corporations, and individuals.

"In our advisory capacity we wish to recommend such action to you as will be productive of the best results, and will at the same time be in accord with the expressed sentiments of the architectural societies of America.

"The following suggestions relate only to the central group of buildings in Jackson Park, it being the intention from time to time to designate other architects for the various important structures that are to be erected in addition thereto.

"That these buildings should be in their designs, relationships and arrangement of the highest possible architectural merit is of importance scarcely less great than the variety, richness and comprehensiveness of the various displays within them. Such success is not so much dependent upon the expenditure of money as upon the expenditure of thought, knowledge and enthusiasm by men known to be in every way endowed with these qualifications; and the results achieved by them will be the measure by which America, and especially Chicago, must expect to be judged by the world.

"Several methods of procedure suggest themselves:

"1. The selection of one man to whom the designing of the entire work should be entrusted.

"2. Competition made free to the whole architectural profession.

"3. Competition among a selected few.

"4. Direct selection.

"The first method would possess some advantage in the coherent and logical result which would be obtained. But the objections are, that time for the preparation of designs is so short that no one man could hope to do the subject justice, even were he broad enough to avoid, in work of such varied and colossal character, monotonous repetition of ideas. And again, such a method would invoke criticism, just or unjust, and would certainly debar the enterprise from the friendly coöperation of diversity of talent, which can be secured only by bringing together the best architectural minds of the country.

"2. The second method named has been employed in France and other European countries with success, and would probably result in the production of a certain number of plans possessing more or less merit and novelty. But in such a competition much time, even now most valuable, would be wasted, and the result would be a mass of irrevelant and almost irreconcilable material, which would demand great and extended labor to bring into coherence. It is greatly to be feared that from such a heterogeneous competition the best men of the profession would refrain, not only because of the uncertainties involved in it are too great and their time too valuable, but because the societies to which they almost universally belong have so strongly pronounced on its futility.

"3. A limited and fair competition would present fewer embarrassments; but even in this case the question of time is presented, and it is most unlikely that any result derived through this means, coming as it would from necessarily partial acquaintance with the subject, and hasty, ill-considered presentation of it, could be satisfactory and the selection of an individual would be open to the same objections made above, as to a single designer. Far better than any of the methods seems to be the last.

"4. This is to select a certain number of architects, choosing each man for such work as would be most nearly parallel with his best achievements. These architects to meet in conference, become masters of all the elements to be solved, and agree upon some general scheme of procedure.

"The preliminary studies resulting from this to be compared and freely discussed in a subsequent conference, and, with the assistance of such suggestions as your advisers may make, be brought into a harmonious whole.

"The honor conferred upon those so selected would create in their minds a disposition to place the artistic quality of their work in advance of the mere question of emoluments; while the emulation begotten in a rivalry so dignified and friendly could not fail to be productive of a result which would stand before the world as the best fruit of American civilization."

Signed, D. H. Burnham, *Chief of Construction.*
John W. Root, *Consulting Architect.*
F. L. Olmsted & Co., *Consulting Landscape Architects.*
A. Gottlieb, *Chief Engineer.*

This paper precipitated a heated debate. There were strong advocates for competition, and the Committee was solemnly warned by some of its members against choosing by any other method; but finally, through a narrow majority, the recommendation was adopted. The Committee then placed in my hands the selection of five architects to design the buildings around the Great Court. The rude plan I have spoken of showed two buildings where the Electrical and Mines now are, but their long axis ran east and west, instead of north and south, as at present. This arrangement would have left five buildings fronting on the Great Court, instead of six, as is now the case. I selected five men, or firms, and the Committee promptly confirmed them. I then sent to each of them the following letter:

"The inclosed recommendation was approved last night by the Board of Directors of the World's Columbian Exposition, and in the same resolution they empowered the Grounds and Building Committee to secure the services of five architects to design the main group of buildings at Jackson Park.

"The Committee authorize me to confer with the following gentlemen, namely: Richard M. Hunt of New York, McKim, Mead & White of New York, George B. Post of New York, Peabody & Stearns of Boston, Van Brunt & Howe of Kansas City with a view to your employment.

"It is intended to place the problem in your hands as to the artistic aspects only:

"1. Of the group as a whole.

"2. Of the separate buildings.

"The Committee are disposed to leave the method of designing to the five architects, and you may determine among yourselves whether to make a joint design of the whole as one, or each to take up separate parts to be modified to meet such views as shall be expressed in your conferences from time to time.

"This Bureau will be expected to supply you with all data about materials, sizes, general disposition and cost of buildings, and it is also to have charge of the constructional features, and, finally, of the execution of the entire work, but with the understanding that the artistic parts are to be carried out with your approval, and that you are from time to time to visit the work either in a body or separately as may be determined wise. Our Consulting Architect, Mr. Root, would act as your interpreter when you are absent, without imparting into the work any of his own feelings.

"I realize the hesitancy you may feel in assuming responsibility for design when you do not fully control the execution of it. The Committee feel, however, that strict economy of the two essentials, Time and Money, will be best subserved by keeping the actual control of the work in the hands of one man and his bureau; and I can assure you that your intents and purposes of design, once agreed upon by the Committee, shall be carried out as you wish, and that they shall not be altered or meddled with, and when exigencies arise, making any important change necessary, you shall be consulted and have the matter in charge the same as in original design.

"I will be pleased to hear from you by wire, if you think favorably of this proposition. I shall be here until Monday evening, and unless detained shall be in New York City Wednesday next, stopping at the Windsor. As in a personal interview it will be possible to make

matters much more plain, I hope to find a note saying that I may have the honor of seeing you. Those who accept should make a preliminary visit here together as soon as possible.

"Yours very truly,

"D. H. BURNHAM, *Chief of Construction.*"

This brought the time up to within a week of Christmas, 1890.

On December 22d I met in New York Messrs. Hunt, Post, Peabody and Mead, and secured an agreement from them, and by telegram from Mr. Van Brunt, that they would visit Chicago together on the 10th of January following. On my return to Chicago, the Grounds and Buildings Committee authorized me to select five architects from Chicago to design the other great structures of the Exposition. The men nominated and promptly confirmed were Burling & Whitehouse, Jenney & Mundie, Henry Ives Cobb, S. S. Beman and Adler & Sullivan. I called on each of them the next morning and obtained acceptance.

The architects met in the office of Burnham & Root on Saturday, January 10, 1891, there being present:

CONSULTING ARCHITECTS OLMSTED & CODMAN		HENRY VAN BRUNT....	Kansas City
CONSULTING ENGINEER GOTTLIEB		DANKMAR ADLER.......	Chicago
RICHARD M. HUNT......	New York	LOUIS H. SULLIVAN.....	Chicago
ROBERT S. PEABODY...	Boston	F. M. WHITEHOUSE.....	Chicago
GEO. B. POST............	New York	S. S. BEMAN......... ...	Chicago
WM. R. MEAD..........	New York	HENRY IVES COBB......	Chicago
		W. L. B. JENNEY.......	Chicago

and myself. Mr. Root was absent from the city, but arrived during the afternoon, in time to meet those present and be introduced to those he was not acquainted with. An organization was effected by the selection of Mr. Hunt as Chairman and of Mr. Sullivan as Secretary, and an adjournment was taken until Monday. That night a banquet was given by the Grounds and Buildings Committee to the Architectural Board at University Club.

On Monday the Board met, but Mr. Root was missing. At noon word came of his illness, which terminated fatally on Thursday afternoon. Mr. Root possessed a mind remarkable for its artistic insight, quickness and clearness of apprehension, and deep sympathy with everything of value about him. Though filled to running over with his own suggestive thoughts, he never failed to grasp another's, and it was his every-day custom to coördinate the elements of discussions with a rapidity and finish that seemed marvellous. His very visions were as real to him as the actual objects of life are to the eyes of other men. He saw comprehensively and exactly, both through his natural eyes and those of his spirit, and his power of expression to the ears, the eyes or the hearts of others kept pace with his own vivid impressions.

I cannot, of course, believe that the architecture of the Exposition would have been better had he lived, but it certainly would have been modified and stamped with something of his great individuality. My own loss I cannot speak of. Our relations had been intimate, and even fond, from the week when first we met. We had lived together for eighteen years without a written agreement or a quick word between us. When he died, I remained with the Exposition only in deference to the judgment and wishes of my friends among the Directors.

The discussions of the Board extended through the week after the death of Mr. Root, the plan being modified by important changes, and at the end of the meeting I apportioned the work among the men as follows:

F. L. OLMSTED & CO.....	Landscape Architects.
RICHARD M. HUNT.......	Administration.
PEABODY & STEARNS..	Machinery.
MCKIM, MEAD & WHITE..........	Agricultural.
GEO. B. POST............	Manufactures and Liberal Arts.
VAN BRUNT & HOWE.............	Electricity.
S. S. BEMAN....	Mines and Mining.
ADLER & SULLIVAN..............	Transportation.
HENRY IVES COBB	Fisheries.
BURLING & WHITEHOUSE.........	Venetian Village.
W. L. B. JENNEY................	Horticultural.

This was only twenty-one months before the date set by Congress for the dedication of the completed grounds and buildings of the Exposition. The work done by the Board at its January meeting was:

1. Confirmation of general scheme.
2. Settling exact sizes of court and canal.
3. Settling exact size and location of the following buildings: Agricultural, Manufactures, Electrical, Mines, Fisheries, Horticultural, Administration, Machinery, Transportation, Venetian Village.
4. The height of cornice around the main court.
5. The approximate height of terraces above datum.

On February 20th the Board met again, this time Mr. McKim coming instead of Mr. Mead, and the New York members being accompanied by Mr. Augustus St. Gaudens, the sculptor, who was retained as adviser. They then brought with them the rough sketches, each of his own building, and the landscape architects brought a full-scale plan of the grounds of Jackson Park, extending from north of the Fisheries Building to south of Machinery Hall.

The following week was one of interest to all the conferrees. Mr. Hunt presided in the meetings. Each designer displayed his sketches upon the wall, explaining the purpose and intent of his work, and submitting to the kindly criticisms of all the others. The Grounds and Buildings Committee spent a day in the room, where every design was carefully explained to them by its author; afterward the proper officers of the National Commission also met the architects, when the same process was gone through again. The whole work was then formally passed upon and adopted by the World's Columbian Exposition and the World's Columbian Commission, and this memorable meeting came to an end late in February, 1891. One of the most eminent artists who had been present at all of the meetings, on parting, remarked: "This has been the most important artistic moment of my life." The sentiment so expressed was echoed by every one present. Then, for the first time, one could commence to form an idea of the architecture which we are now familiar with. The strongest enthusiasm prevailed, and a high sense of the importance of the work dawned upon us.

During January, when the main plan of the work had been approved, the Chief Engineer let a contract for the excavation of the basin, lagoons and inlets, and while the architects were here in February the work commenced.

After the adjournment, it was determined by the Grounds and Building Committee to select an architect for the Woman's Building by competition, to be confined strictly to women. Twelve sets of sketches were submitted for the day appointed, and three prizes were given: the first to Miss Sophia G. Hayden, of Boston, the second to Miss Lois Howe, of Boston, and the third to Miss Laura Hayes, of Chicago. Miss Hayden was at once employed as the architect of the building, and since then has made the designs and overlooked the construction of the building. Examination of the facts show that this woman had no help whatever. The design was made by herself in her own home.

This brings the history of the enterprise down to about March 1, 1891. At this point, for the first time, the Chief of Construction was enabled to form an estimate of the work to be done. Roughly speaking, it consisted of reclaiming nearly seven hundred acres of ground — only a small portion of which was improved, the remainder being in a state of nature, and covered with water and wild-oak ridges — and in twenty months converting it into a site suitable in substance and decoration for an exposition of the industries and the entertainment of representatives of all the nations of the world. On its stately terraces a dozen palaces were to be built — all of great extent and highest architectural importance — these to be supplemented by two hundred other structures, some of which were to be almost the size of the Exposition Buildings themselves; great canals, basins, lagoons and islands were to be formed; extensive docks, bridges and towers to be constructed. The standard of the entire work was to be kept up to a degree of excellence which should place it upon a level with the monuments of other ages. The opportunity for gaining honorable distinction, however, made the duty of choosing men for the force comparatively easy, and in a very short time after the plans were finally adopted, the following were on the field of action, working with one object, the welfare of the great enterprise:

CHARLES B. ATWOOD.............	*Designer in Chief.*
WILLIAM PRETYMAN.	*Director of Color.*
E. G. NOURSE.....................	*General Engineer.*
FREDERICK SARGENT.............	*Electrical Engineer.*
J. C. SLOCUM......................	*Mechanical Engineer.*
WM. S. MACHARG.................	*Sanitary and Water Engineer.*
JOHN W. ALVORD	*Engineer of Grades and Surveys.*
EARNEST R. GRAHAM............	*Assistant Chief of Construction.*
RUDOLPH ULRICH.................	*Landscape Superintendent.*
DION GERALDINE	*General Superintendent.*

Later the following changes occurred. Mr. Frederick Sargent assumed entire charge of all mechanical plants, Mr. Slocum going out and Mr. R. H. Pierce becoming Electrical Engineer, and in March of this year Mr. Sargent withdrew, leaving Mr. Charles F. Foster in charge as Mechanical Engineer, where he still remains. Mr. Gottlieb, the Chief Engineer, withdrew in the summer of 1891 and Mr. Edward C. Shankland took his place. Mr. W. H. Holcomb has since joined the force as General Manager of Transportation. Mr. Pretyman resigned in May, 1892, and Mr. Frank D. Millet took his place. Col. Edmund Rice, of the United States Army, assumed control of the Guard in May, 1892. Marshal Edward Murphy took charge of the entire Fire-department in December, 1892, taking the place of Mr. A. C. Speed, who had been in charge until then.

Mr. C. D. Arnold was made Official Photographer. Dr. John E. Owen was made Medical Director. Mr. Atwood came out to join me in my private practice in the spring of 1891, but the needs of the Fair were so great that he assumed the place of Designer-in-Chief instead.

The Venetian Village being abandoned, and it having been concluded to place the Music and Fine Arts Buildings in Jackson instead of in the down-town park, Mr. Whitehouse was urged to design the Fine Art Palace, but severe illness at the time prevented him from doing it. This building then went to Mr. Atwood. When the Venetian Village on the end of the pier in front of the Grand Court was abandoned, Mr. St. Gaudens suggested the thirteen columns as shown on the earlier plans of the work; but this being finally deemed to be inadequate, the Music-hall, Peristyle and Casino, as one composition, was entrusted to Mr. Atwood, and then Mr. Whitehouse also took up the very important work of designing the Festival Hall.

The following buildings have been erected in Jackson Park and Midway Plaisance. Those built by the Exposition, as follows:

Administration Building.
Machinery Hall and Boiler-house.
Pumping-Station.
South Colonnade.
Agricultural Building.
Forestry Building.
Dairy Building.
Freight-Houses.
Convent of La Rabida.
Stock-Ring.
Company's Shops.
Company's Barn.
Sewage Cleansing Works.
Landscape Propagating-house.
Tank-house.
Saw-mill.
Peristyle, Music-Hall and Casino.
Manufactures and Liberal Arts.
Electricity Building.
Mines and Mining Building.
Transportation and Annex.
Terminal Station.
Grounds and Buildings, Headquarters.
Photographic Building.
Horticultural Building.
Horticultural Greenhouses.
Woman's Building.
Fire and Police Houses.
Fisheries Building.
Mechanical Offices.
Art Building.
City Police-Stations, Woodlawn and Hyde Park.
Art Institute, (down-town).
Leather Building.
Silos.
Model Building.
Stock-barn.
Custom-house.
Choral-music Building.
Entrances.
Music-stands.
Perron and Sheds.
Sheds for Empty Cases.
Children's Building.
Public Comfort.

These buildings aggregate 6,500,000 square feet.

The following States have built headquarters: Illinois, California, Colorado, Washington, South Dakota, Nebraska, North Dakota, Kansas, Texas, Utah, Iowa, Montana, Kentucky, Florida, Arkansas, Minnesota, Missouri, Louisiana, West Virginia, Pennsylvania, New York, Maryland, Delaware, New Jersey, Rhode Island, Massachusetts, Vermont, Connecticut, New Hampshire, Maine.

The State buildings occupy over 40,000 square feet.

The following Foreign Governments have built: Great Britain, Canada, Russia, Germany, Ceylon, France, Turkey, Hayti, Norway, Sweden, Brazil, Nicaragua, Colombia, Guatemala, Costa Rica, Japan, Venezuela, New South Wales, Spain and East India, covering an area of over 300,000 square feet.

The following concessionaires have built: Bedouin Encampment, Lapland Village, Ostrich Farm, Dahomey Village, Brazilian Concert-hall, Chinese Village and Theatre, Algerian and Tunisian Bazaar, Japanese Bazaar, Dutch Settlement, German Village, Street in Cairo, Ferris Wheel, Volcano of Kilauea, Captive Balloon, East Indian Village, American Indian Village, Hungarian Café, Austrian Village, Persian Concession, French Cider-press, Ice Railway, Eiffel Tower, Natatorium and Vienna Bakery, Irish Village, Irish Industries Village, United States Sub-marine Diving Company, Log Cabin, Reproduction of St. Peter's, Moorish Palace, Libby Glass Company, Turkish Village, Hagenbeck's Animal Show, Panorama of Bernese Alps, Venice-Murano Glass Company, Merck Drug Exhibit, Café de Paris, Electric Scenic Theatre, Adams Express Company, International Dress and Costume Company, Workingman's Home, Diamond Match Company, Clam-bake, Walter Lowney Chocolates, Walter Baker Cocoa, Van Houten Cocoa, Japanese Tea-house, Great White Horse Inn, *Puck* Building, White Star Steamship Company.

They will aggregate over 1,100,000 square feet. The total grand area of the buildings in the Fair is something less than 200 acres.

The artists engaged on the decorations were:

G. J. Melchers.
W. McEwen.
E. H. Blashfield.
C. S. Reinhart.
E. E. Simmons.
R. Reid.
W. Shirlaw.
K. Cox.
J. C. Beckwith.
F. D. Millet.
L. C. Earle.
E. E. Garnsey.
G. W. Maynard.
L. H. Sullivan.
W. L. Dodge.
D. M. Armstrong.
Turner.
J. A. Weir.
C. C. Coleman.
M. J. Cassatt.
C. Wheeler.
L. J. Millet and others.

The sculptors were:

D. C. French.
E. C. Potter.
L. G. Mead.
P. Martiny.
M. A. Waagen.
K. Bitter.
C. Rohl-Smith.
A. P. Proctor.
L. Taft.
E. Yandell.
A. L. Rideout.
J. J. Boyle.
R. W. Bock.
Bock.
Pratt.
T. Baur.
J. A. Blankingship.
H. A. McNeill.
E. Kemeys.
R. Kraus.
J. Gelert.
O. L. Warner.
A. St. Gaudens.
F. McMonnies.

I cannot, in this paper, describe the works or tell you the amounts of material which have gone into construction. This must be done in an official report, which will take many months to prepare.

I can, however, tell you how, during the storms of summer, the frosts of winter, all day, all night, week in and week out, for two years, the little band of American boys ran the race for victory with Father Time, and won it. Without looking for or expecting compensation at all equal to the services they have rendered, without jealousy, with ready willingness, these men have been ever at the front, emulating each other in the amount and quality of the services rendered.

Though I cannot now pick individuals to be praised, I can congratulate all on the glory they have won through constancy and self-sacrifice such as no other country ever gained from her sons in time of peace. They have shown what, to me, is the greatest heroism — that of forbearance and constant helpfulness. I am most proud of having been associated with them.

A Silver Dome for the Denver Capitol. — Seven thousand square inches of the dome of the capitol building are to be covered with silver, two ounces to the square foot. — *N. Y. Press.*

SYENITE QUARRIES AT ASSOUAN.[1]

THE only place in the East where syenite, or pink granite, is found in quantity is at Assouan, and from this quarry came the columns of the Greek and Roman temples at Constantinople, Rome and Baalbec. To get the proper idea of the size of this quarry, which has been drawn upon for material by all ages, it is best to ascend to its highest point, and to bear in mind that the sands of the desert have covered its greater portion in later years. Near the top of the quarry is an opening containing a monolith 12 feet square and 100 feet long, detached and raised up, but not removed. In the long after years from the time it was detached, the attempt has been made to break the monolith in two by cutting a groove around it, but the brains and hands of the masters who detached and raised it were not there and the trial of simply breaking it was a failure. The quarrying of one of these monoliths was a work of time. The top of the quarry having been dressed off, the outline of the monolith was laid off. Around this outline a channel about two feet wide was chiselled and broken out to the depth of the monolith. This channel was cut with a gouge or half-round chisel, about half an inch wide. A groove six inches deep was cut on each side of the channel and the granite broken out between the two grooves. The chisel marks left on the side face of the quarry vary, but are about six inches high or deep. Some of the cuts are perfectly uniform, showing the good workman; while others are irregular, showing the apprentice's hand.

After the first cut was started, a second workman started-in behind the first and took another six-inch cut; this process was followed by others until the bottom of the monolith was reached. All around the bottom of the block, square taper openings, three inches apart, about three and one-half inches high by five inches wide, were cut wedge-shaped about six inches inward, after which each hole was wedged and the monolith split off. These taper holes with their sharp square corners are a marvel. Any mechanic trying to cut a square hole through a piece of cold iron with a hammer and chisel will appreciate what it means to make these openings after he has broken some of his chisels. From the fact that the monoliths left in the quarries lie at an angle, it would appear as if they had resorted to tilting and blocking to elevate them. In the limestone quarries they took a cut about twelve inches deep, and much coarser, as the material, being softer, permitted the use of a longer chisel, or gouge; but with this hard, tough syenite, they had to use shorter chisels and take finer cuts. There is nothing in Egypt to prove the use of copper tools in stonework, but they undoubtedly had good steel tools. The conquerors who succeeded the Egyptians, having nothing but fanaticism and insolence for their portion, could not make a pound of iron or steel, and from that day to this have been destroying the works of the old masters, to rob them of the iron used in their construction. The result is that even the tools of the ancient workmen have disappeared.

In Egypt all work is done sitting down. They turn table-legs and all other woodwork on a lathe on the ground. The work is revolved back and forth by a large bow, worked with the right hand, the gouge or chisel cutting only when the work revolves forward. The left hand guides the outer end of the gouge or chisel, while the inner end is held to the steady rest between the first and second toe of the right foot. The first and second toe of an old turner lengthens out beyond the other toes, and the space between them increases. They grow like the thumb and first finger, as they gradually assume their new functions.

ILLUSTRATIONS

[Contributors are requested to send with their drawings, plans and a full and adequate description of the buildings, including a statement of cost.]

THE CHAMBER OF COMMERCE, BOSTON, MASS. MESSRS. SHEPLEY, RUTAN & COOLIDGE, ARCHITECTS, BOSTON, MASS.

[Gelatine Print issued with the International and Imperial Editions only.]

COMPETITIVE DESIGN FOR THE MUSEUM OF ARTS AND SCIENCES, BROOKLYN, N. Y. MR. W. B. BIGELOW, ARCHITECT, NEW YORK, N. Y.

COMPETITIVE DESIGN FOR THE MUSEUM OF ARTS AND SCIENCES, BROOKLYN, N. Y. SUBMITTED BY MESSRS. W. B. CHAMBERS AND J. W. CROMWELL, JR., NEW YORK, N. Y.

To this design was awarded one of the three equal prizes ($500.00) in the first competition.

DESIGN FOR CATHOLIC CLUB-HOUSE, ST. LOUIS, MO. MESSRS. BARNETT & HAYNES, ARCHITECTS, ST. LOUIS, MO.

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[1] Extracted from remarks made by John M. Hartman before the Franklin Institute, April 19, 1893.

HOUSE FOR JOHN W. PEPPER, ESQ., JENKINTON, PA. MR. WILSON EYRE, JR., ARCHITECT.

[Additional Illustrations in the International Edition.]

TWO OF THE ASTOR MEMORIAL BRONZE DOORS FOR TRINITY CHURCH, NEW YORK, N. Y. MR. J. MASSEY RHIND AND MR. CHARLES H. NIEHAUS, SCULPTORS, NEW YORK, N. Y.

[Two Gelatine Prints.]

EARLY in June were hung and swung for the first time the new bronze doors which are to close the north and south porches of Trinity Church, New York, and remain so long as the fabric endures: parts of the memorial which Mr. William Waldorf Astor has established to the honor of his father, John Jacob Astor second. The other portions of the memorial are the doors for the main porch which, because of his preoccupation on the sculpture of the Administration Building of the World's Fair, Mr. Karl Bitter has not yet been able to complete.

Of the completed doors now hung, cast and finished by the Henry-Bonard Company, the one for the north porch was modelled by Mr. J. Massey Rhind, a Scotchman by birth, one of several brothers who follow the same profession at home, and a sculptor amongst whose other works can be counted a large and elaborate temperance fountain which is nearly ready for erection at Albany. The door for the south porch is the work of Mr. Charles H. Niehaus, a sculptor of German descent but of American birth and largely of American training. The doors are, we understand, solid, not plated, and each valve measures 3′ 3″ x 12′, each of the panels measuring 23″ x 2′ 3″.

All that relates to the architectural adjustment and the alterations in the old porches made necessary by the new work was placed in the hands of Mr. R. M. Hunt.

The plates show only the bronze doors proper, but in each case the treatment includes a sculptured tympanum which, in the case of Mr. Rhind's work, shows the full space occupied by a group of three figures: Our Lord, the Good Shepherd, protecting a few sheep and lambs, supported on either hand by kneeling angels — all included within a trefoiled arch.

Mr. Bitter's tympanum is to include a standing figure of the Saviour supported by three kneeling angels on each side, while in the lintel below the tympanum is placed a row of niched figures of the twelve Apostles. Also, in addition to the panelled doors, his design includes a framing to the panel-work consisting of vertical canopied figures in high relief upon the styles, while the upper and lower rails are kept in harmony by the introduction of reclining figures, while heads in high relief fill-in the corners. In other words the scheme is, as it properly should be, a richer and more elaborate one than that employed for the side porches.

Mr. Niehaus fills his tympanum with the seated figure of an angel between whose outstretched hands runs a ribbon inscribed "King of Kings and Lord of Lords"; the figure is supported by the seals of Trinity Parish and of the Society for the Propagation of the Gospel.

In the north doorway Mr. Rhind confines himself to subjects drawn from Bible history, adopting the selection made by the Rev. Dr. Dix.

These subjects are, beginning at left-hand-top panel and reading downwards:

No. 1. A legend from Mrs. Jameson's "*Sacred and Legendary Art,*" called, *Domini quo vadis,* where a vision of our Lord appeared to Peter, as he, Peter, was about to leave Rome, when Nero was persecuting the Christians. The quotation means, "Lord, wherefore do you go?" No. 2. The conversion of the jailer when Paul and Silas were released from prison by the Angel of the Lord (Acts xvi, 26–28). No. 3. The Feast of the Passover, where the father of the family wets the lintel of the door with the heart of the lamb, otherwise the Angel of the Lord would have killed the first born (Exodus xii, 23). No. 4. The blessed and the innocent entering in at the door of Paradise, with Peter standing with the keys and the angel pointing to the Crown of Glory (Revelations xxii, 14). No. 5. Peter healing the lame man on the steps of the Temple, with John beside him and a blind man wishing to be cured (Acts iii, 1–2). No. 6. The man fleeing to the City of Refuge with a guard at the door, and the pursuer in the distance or middle distance stopping when he sees the priest receiving the poor culprit (Deuteronomy xix, 1–6).

Mr. Niehaus, on the other hand, has drawn the subjects of his panels from the history of New York, particularly those which are interwoven with the history of the parish. In this case chronological sequence starts at the bottom and proceeds upwards in pairs. No. 1 shows Hendrik Hudson on the deck of the "*Half-Moon*" as he approaches Manhattan Island in 1609. No. 2 shows Dr. Barclay preaching to the Indians in 1738. No. 3 shows Washington about to enter St. Paul's, the chapel of Trinity Parish, and No. 4 shows a consecration of four bishops in the same chapel. No. 5 shows a procession entering Trinity Church soon after its completion in 1846. No. 6 shows the dedication of the Astor Memorial Reredos, in memory of William B. Astor, in 1877.

HEWELL GRANGE, BROMSGROVE, ENG.: THE ENTRANCE HALL. MESSRS. BODLEY & GARNER, ARCHITECTS.

WE have already given some illustrations of this residence, which is one of the most satisfactory examples of modern English work.

LANCASHIRE AND YORKSHIRE BANK, LIMITED, MANCHESTER, ENG. MESSRS. HEATHCOTE & RAWLE, ARCHITECTS.

THE position of this bank, which faces King Street, Manchester, demanded an imposing building, and the architects have carried out their commission so successfully as to make it necessary to rebuild a great many buildings in the neighborhood.

ST. KEVERNE CHURCH, CORNWALL, ENG. MR. EDMUND SEDDING, ARCHITECT, PLYMOUTH, ENG.

THIS is one of the largest, and certainly one of the most interesting of Cornish churches. St. Keverne, or St. Kieran, is supposed to be the same as St. Perran, one of the most celebrated of Cornish saints. This is the largest church of the four dedicated to him, and was originally connected with the monastery at Beaulieu, and there is ample evidence of the old style both in the work now standing and in the fragments that have been discovered in opening-out the rood-loft stairways and passages between the arcades. These fragments are of a very ornate character, and still retain their coloring. Some belong to an altar, some to a stone reredos. Only one fragment of a figure has been found. This is of carved stone, and exquisitely executed. The arcades are certainly unique in Cornish architecture, and it is easy to see what has been re-used from former work, while the missing parts were substituted by rude copies of former work. This rebuilding took place in the fifteenth century, when the church was much enlarged. There is part of a Norman window still extant, while all the piers on the north side are of thirteenth-century date, the south piers are of fourteenth-century date. The beautiful tower and spire were erected late in the fifteenth century. It is curious to find two sets of rood-loft stairs, the westernmost being about 1440, the other one being 100 years later. The work of restoration is in progress. The cost will be about 3,000*l.*

ST. SAVIOUR'S, DARTMOUTH, ENG. MR. EDMUND SEDDING, ARCHITECT, PLYMOUTH, ENG.

THE chancel of this church was restored by the late John D. Sedding a few years ago. It is now proposed to restore the nave. The church is brimful of interest, and is celebrated for its lovely chancel screen, which is beautifully colored; the pulpit is also well-known — an example of colored stonework, richly carved, of late fifteenth-century date. Dartmouth was besieged at the time of the Civil War, and the church suffered considerably.

Note: — Owing to custom-house delays, the issuance of the preceding four illustrations properly belonging to this number must be postponed to next week.

COMMUNICATIONS

[*The editors cannot pay attention to demands of correspondents who forget to give their names and addresses as guaranty of good faith; nor do they hold themselves responsible for opinions expressed by their correspondents.*]

A QUESTION OF COMMISSION.

BOSTON, MASS., July 31, 1893.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — A matter of interest regarding professional fees has arisen with me on which I should like to ask your opinion.

Under peculiar circumstances and conditions, which I suppose need not be entered into here, I made a contract to furnish plans and specifications with details for a large building costing approximately $250,000.00 for the very moderate sum of $2,000.00. In the course of the work I found, as frequently happens, the owner desired to make modifications — much had to be redrawn, etc., for which I was obliged to ask an addition of $500, which was granted. The work was completed and the contract virtually ended with the delivery of my plans, etc. After the building was far progressed the owner desired to make a radical change in an important feature of the building — calling for considerable study — a number of experimental drawings made and set aside and finally the working-drawings, details, etc., of an elaborate tower.

The extra cost of this tower over and above what was at first designed, I have been told, was not far from $20,000 and the omitted work for which it was substituted would perhaps be $10,000 which of course added would bring the newly-designed part of the building between $25,000 and $30,000, actual value.

For designing this, I wrote the owner I thought I ought to receive the ordinary compensation of three and one-half per cent. He replies to me citing the original contract with its supplementary concession which I have mentioned (this had barely afforded moderate draughtsman's compensation), and he mentions a figure that he

is willing to pay which he thinks the service is worth — a figure that seems to be even less pro-rata than the original contract.

It is not the purpose of this letter to ask you to judge between us whether that figure, or more, or less, is a fair compensation. What puzzles me is the question: In strictest equity am I right to charge in this case as in the uniform custom of my office from which I rarely ever vary — three and one-half per cent — the standard American Institute rate? Had I been paid the ordinary rate for the entire work my compensation would have been over eight thousand dollars and there would not have been the slightest question about this final bill.

The contracts as they were, which gave me only $2,500, contained no provisions to prejudice or fix the compensation of any supplementary work.

Now, ought I in *full fairness* to consider it binding upon me to admit its pro-rata of percentage a precedent to fix my compensation for the new tower? Very truly yours, X.

[WE are sorry not to be able to give X much comfort, but it seems to us that the value which he put on his services at the outset is that which his client has a right to regard as governing any extension of the transaction between them. If X, when he was asked to make drawings for the tower, had frankly told his client that the remuneration he had agreed to accept was inadequate, and that he must charge the regular three and one-half per cent rate for the additional work, his client would have been free to abandon the tower, or have some one else design it, and if he chose to keep on with X, after such an explanation, he could not, later, refuse to pay the three and one-half per cent; but we do not see how, without such notice, he could fairly be held to a change in the rate of compensation which had been agreed upon. — EDS. AMERICAN ARCHITECT.]

NOTES AND CLIPPINGS

A NOVEL METHOD OF ELECTRIC HEATING. — In the methods of electric heating now commercially practised — as, for instance, the Cowles electric furnace, the fusion electrolytic aluminium process, and Benados arc welding-process, and the Thomson low-tension welding-process — the object aimed at is the production of a point or plane or zone of high resistance, in a conductor otherwise of good conductivity. In some cases this is done by breaking the metallic circuit, and bridging the gap by an arc; while in others, as in the Thomson method, the imperfect contact of two pieces of metal, to be welded together, causes the resistance which produces the sudden drop of potential necessary for the immediate and local development of heat. A new method of effecting the same object has recently been introduced by Messrs. Eugène Auguste Clement Lagrange and Carl Hubert Auguste Hoho, of Brussels. These inventors attain their end by the very unlikely means of dipping the metal to be heated into liquid, such as water, and making it part of the electric circuit. If a piece of iron connected to one pole of a generator be dipped into acidulated water contained in a metal tank, which is itself connected to the other pole of the generator, an electrolytic action is set up. Oxygen and hydrogen are liberated, and deposited on the two electrodes. If matters are so arranged that the hydrogen goes to the iron, it quickly interposes a badly conducting medium between the metal and the water. If the electromotive force be high, sufficient current can be forced through this envelope of hydrogen to raise it and the skin of the metal to a very high temperature. The oxygen goes to the containing vessel, and being spread over a very much larger surface, does not cause any appreciable increase in heat. It is stated that a wrought-iron bar may be brought to a welding heat by this method, and that fragments of amorphous carbon can be detached from a carbon rod, showing that a temperature of 4,000 degrees C. has been attained. During recent experiments at Berlin a current of 220 ampères at a pressure of 120 volts was employed, and brilliant results obtained. It is evident that every atom of oxide will be cleared off by the action of the hydrogen, and a perfectly clean surface produced. The process presents possibilities yet to be investigated in the reduction of ores. A carbon crucible can be raised to a white heat in a bath, or the ores themselves made to glow in an atmosphere of hydrogen. At Essen, experiments are being made in the hardening of armor-plates, as an intense surface heat can be produced and quenched without the general body of the metal being affected. One great advantage is that fairly high electromotive forces can be employed, and hence the conductors, clamps and other apparatus can be of moderate section. — *Engineering.*

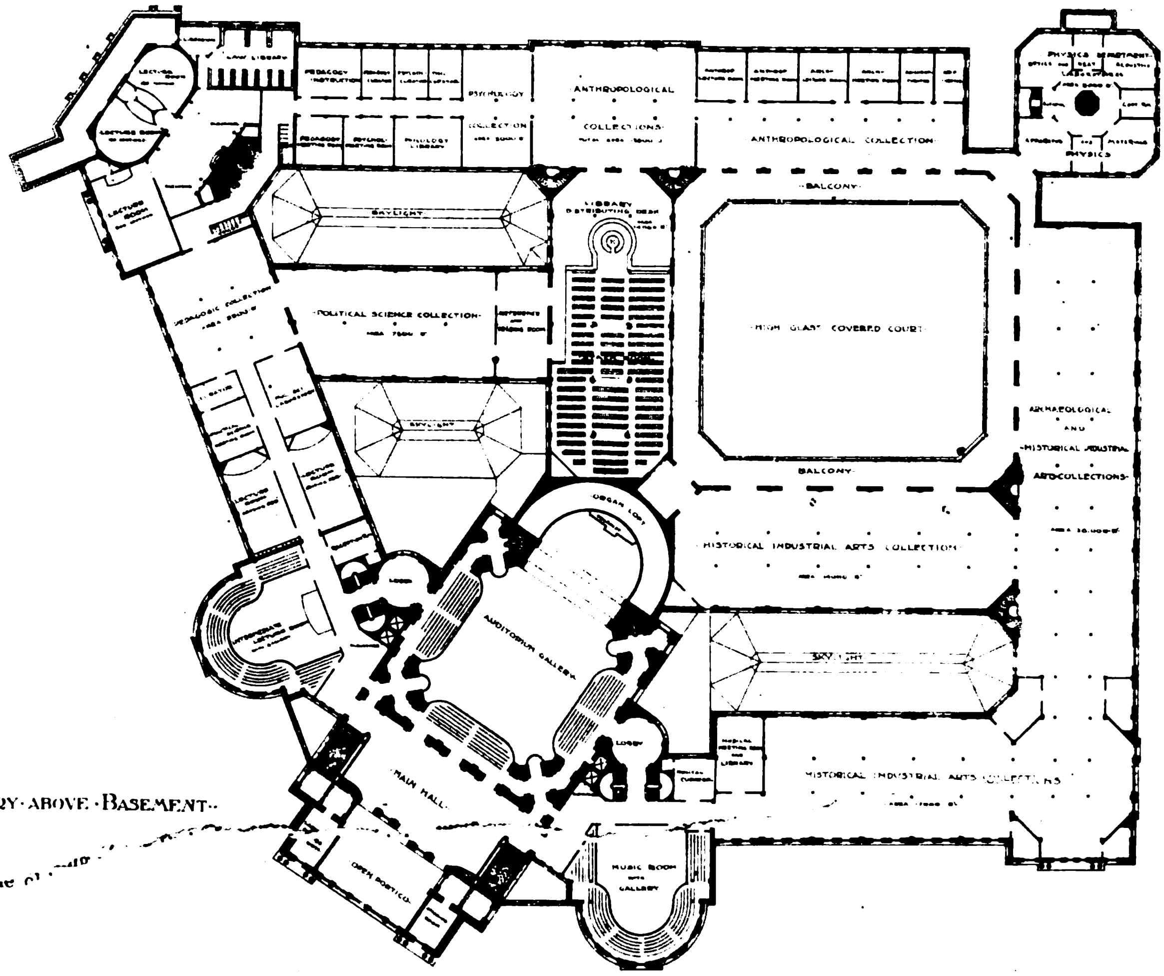
CLEANING AND TRANSFERRING FRESCOES. — In the opinion of Cornelius frescoes are best cleaned with bread. The mouldy appearance which sometimes shows itself can be removed with a wet sponge, unless it arises from saltpetre in the walls, in which case there is no remedy. These injuries must be provided against in the construction of the walls: the vertical progress of damp may be intercepted by covering one of the lower courses of bricks or stones with sheet lead, which must be protected on each side by a coat of pitch; the walls may be then continued as usual. Frescoes may be safely washed with a soft sponge and water, vinegar and wine may be used with safety, even frescoes that have been whitewashed over can be washed clean. The frescoes by Raphael, in the Stanze of the Vatican, of nearly two centuries of dirt, were washed with wine by Carlo Maratta. As many valuable frescoes, if left in their original localities, must have inevitably perished through the bad construction of the walls, unfit situations, or from other causes, the invention of some mode of removing them from their objectionable situations became an object of great interest, and several very ingenious methods of transferring frescoes from walls have been devised, and often practised with success. Mr. Ludwig Gruner removed and transferred to canvas in 1829, at Brescia, some frescoes by Lattanzio Gambara in the convent of St. Eufemia in the following manner: The first process was to clean the wall perfectly; then to pass a strong glue over the surface, and by this means to fasten a sheet of fine calico upon it. The calico, being made fast by the glue to the irregularities of the wall, was itself covered with glue, and some strong linen glued over it. "In this state heat was applied, which caused the glue, even on the fresco, to sweat through the cloths, and to incorporate the whole. After this a third layer of strong cloth was applied on a new coat of glue. The whole remained in this state two or three days (the time required may vary according to the heat of the weather). The superfluous cloth extending beyond the painting was now cut off so as to leave a sharp edge; the operation of stripping or rolling off the cloths began at the corners above and below, till at last the mere weight of the cloth and what adhered to it assisted to detach the whole, and the wall behind appeared white, while every particle of color remained attached to the cloth. To transfer the painting again to cloth a stronger glue is used, which resists moisture, it being necessary to detach the cloths first used by tepid water after the back of the painting is fastened to its new bed." Some frescoes by Paul Veronese in the Morosini Villa, near Castel Franco, were transferred by Count Balbi, of Venice. Cloth was fastened to the wall by means of paste made of beer and flour, and riveted to the irregularities of the surface by means of a hammer composed of bristles. — *The Architect.*

TREES IN PARIS. — Paris has 87,655 trees in its streets, and each tree represents a cost to the city of £7. This makes, in round numbers, £600,000 worth of trees in the streets. — *Scientific American.*

TRADE SURVEYS

THE volume of clearing-house exchanges so far this year is thirteen per cent less than for same time last year. General restriction, universal liquidation, are in progress. Fright has taken the place of apprehension in some quarters over increasing stringency. Currency is being hidden and bank funds are narrowing down. Financial reviews are contradictory and unsatisfactory. The attention of the people is directed to Congress for relief, but there is no present assurance of early action, despite the clamors of business and banking interests. Necessity will decide what shall be done, and not any mere arbitrary act. This necessity that is to determine our course through the financial tangle does not at present exist. It will be developed in the near future. It will be in the nature of a surprise to all. The requirements and the capacities of civilization are greater than the average business man or legislator conceives. They are trying to deal with the problems of to-day and to-morrow as they did ten or twenty years ago, forgetting that growth brings necessities and requirements foreign to those suited to infancy. Herein is the fundamental error of all argument and proposed treatment. The error will never be voluntarily corrected. Nothing but the irresistible pressure of stern necessity will bring about the results for which the whole nation expectantly awaits. The small volume of business done expresses the deep-seated fear prevailing. Conditions are better than would be supposed from surface indications. A reaction will necessarily set in to compensate for the repression of forces in all directions. That reaction can come only after the common sense of the great body of the people has been satisfied. The present depression came suddenly, and it will go as suddenly, but not until the evil which began to gather like a tumor thirty years ago is destroyed — that evil which makes producing and exchanging interests so much dependent upon mere instruments of exchange. The business world has taken warning, and is doing very little — only enough to keep the machinery of production ready to start full time at an hour's notice. Enterprise has retired. Speculation is on the alert to take advantage of the necessities of unfortunates. Disemployment is spreading. Wages reductions, although not sweeping, are quite frequent. Cost of raw material is low, and, in some instances, declining. Building operations have been suddenly curtailed. Mills and factories are running only to fill orders. Contracts for material for future use are not made. Current requirements only are being filled. Banks scrutinize paper. Extensions are grudgingly granted. On the other hand, there are some bright spots. Mortgage-indebtedness is lighter. Railroad rates are reasonable. Crops are encouraging, but prices are desperately low. In the industries proper, prices are for the most part stationary. Iron, steel, leather, hides, boots and shoes, clothing, wool, cotton and clothing of all descriptions seem to have reached a limit in the descending scale. The only present alternative is closing down. Print-cloths touched 2 3-4. Textile goods generally are firm, because there is no room for weakness. The smaller shops suffer less than the larger, especially in New England. In the Western States, where industries are less diversified, more distress prevails. But, it must be kept in mind, the managers of the country's interests know all this blackness will disappear. Last year was the best freight year the railroads ever had, the amount hauled being 4,392 tons per mile. The average haul per ton was 112 miles. The total revenues of our railroad system were $473,000,000, of which $239,000,000 was paid as interest and $83,000,000 as dividends. Germany and Russia are having a tariff war, each adding duties of imports. A scheme is under consideration to make Galveston a gateway to Europe for prairie products. There is renewed activity in several oil fields. Improving conditions are reported in Australasia. Mexico is taking radical and practical steps to increase the investment of capital in that country. Franchises and concessions are to be granted for five years, which will free property from taxes and permit free entry of goods and machinery to be used. The condition, however, is that the minimum of capital invested will be $250,000. Irrigation schemes are attracting capital in Mexico. The telephone is superseding the telegraph between London and Paris, and its use will soon be extended to other European capitals. The schemes to establish telephone lines between large cities in this country progress slowly just now, because of the uncertain commercial value of such lines. Truck-farming in the South is offsetting dulness in iron and coal, and creating a good volume of traffic for the railroads. Exporters anticipate increased wheat and flour exports to England because of the severe depression in England, reaching forty per cent deficit over last year. Serious labor disturbances continue in the mining regions of England.

S. J. PARKHILL & Co., Printers, Boston, U. S. A.



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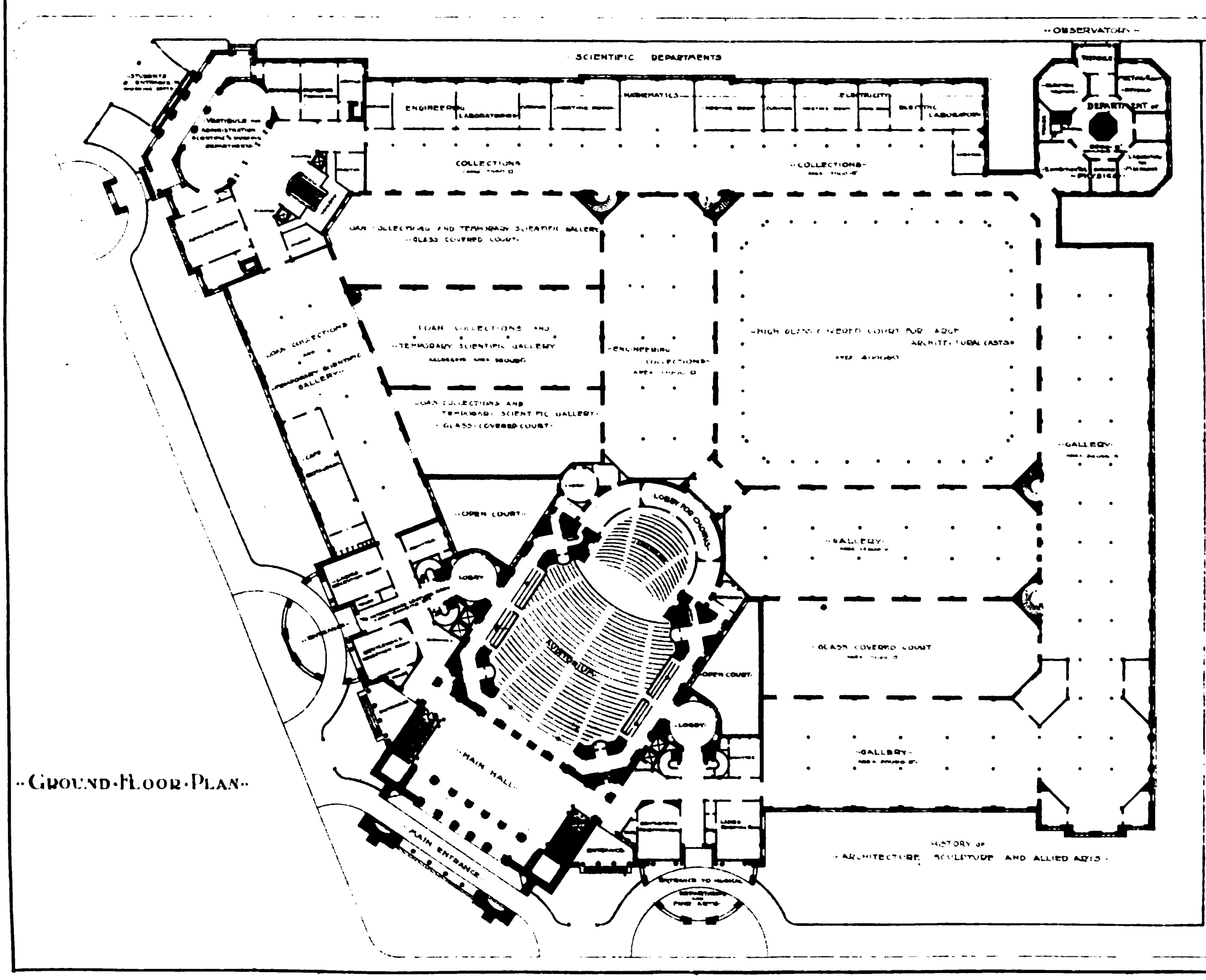
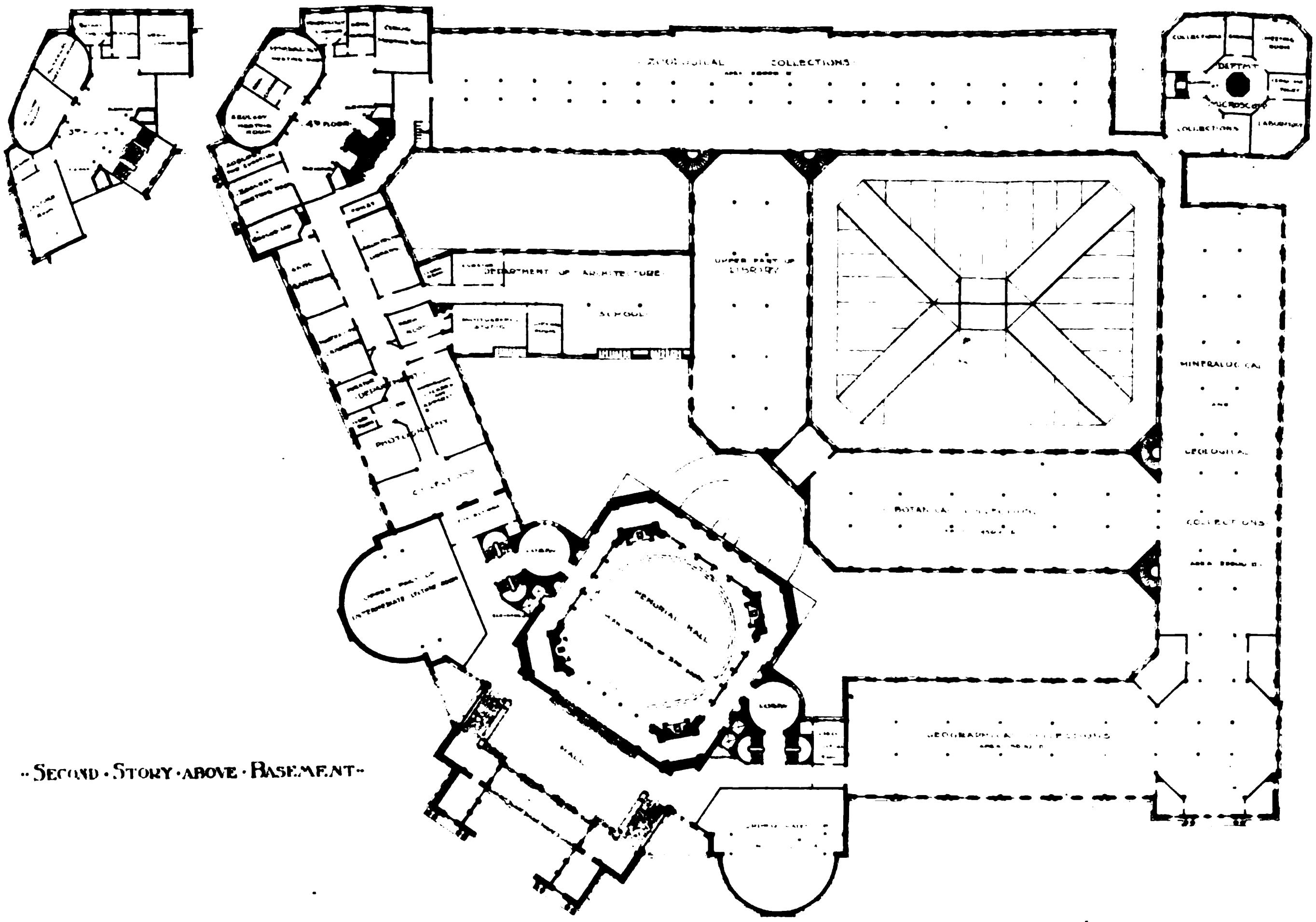


·Ground·Floor·Plan·



-SECOND-STORY-ABOVE-BASEMENT-

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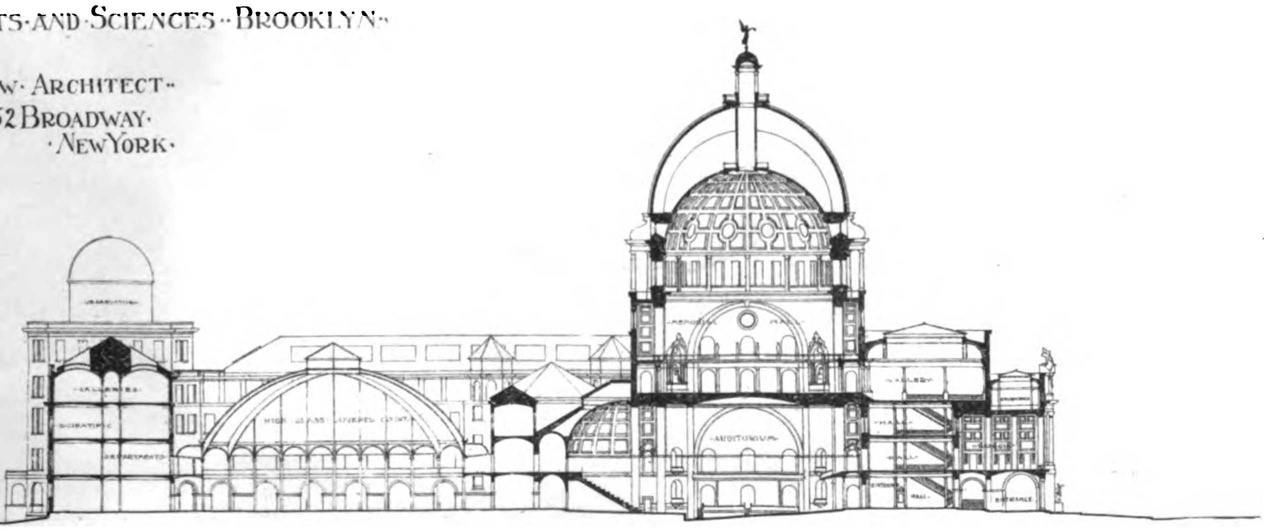
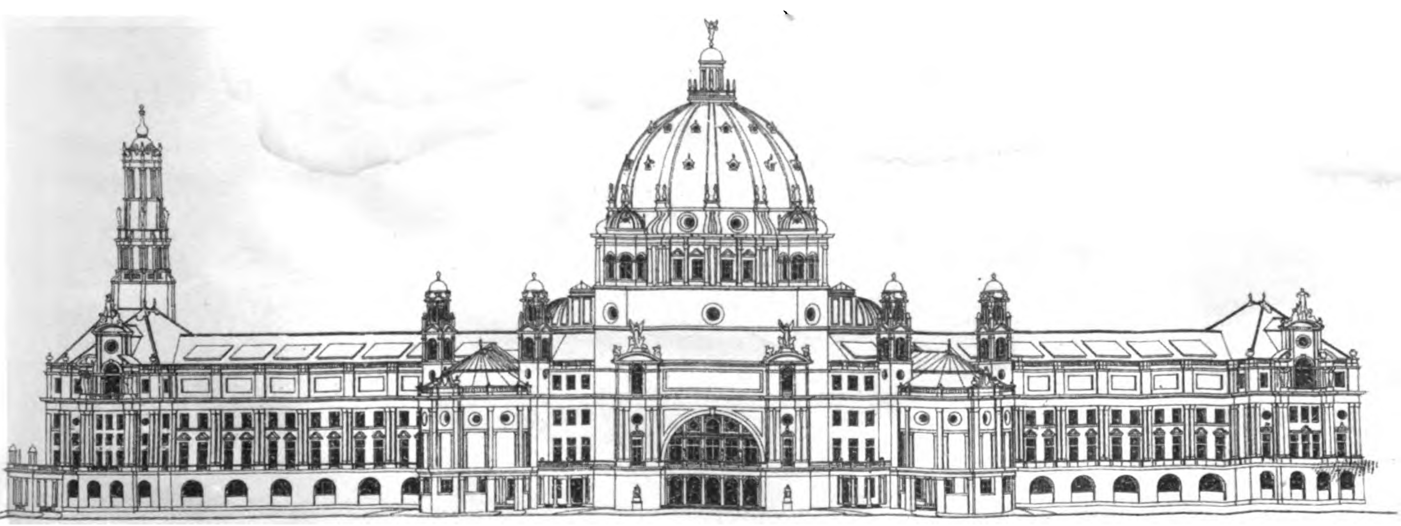
-WM B. BIGELOW-ARCHITECT-
-52 BROADWAY-
-NEW YORK-





American Architect and Bu[ilding News]
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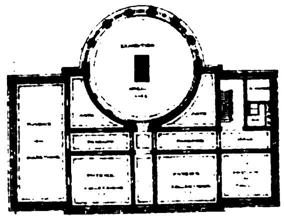

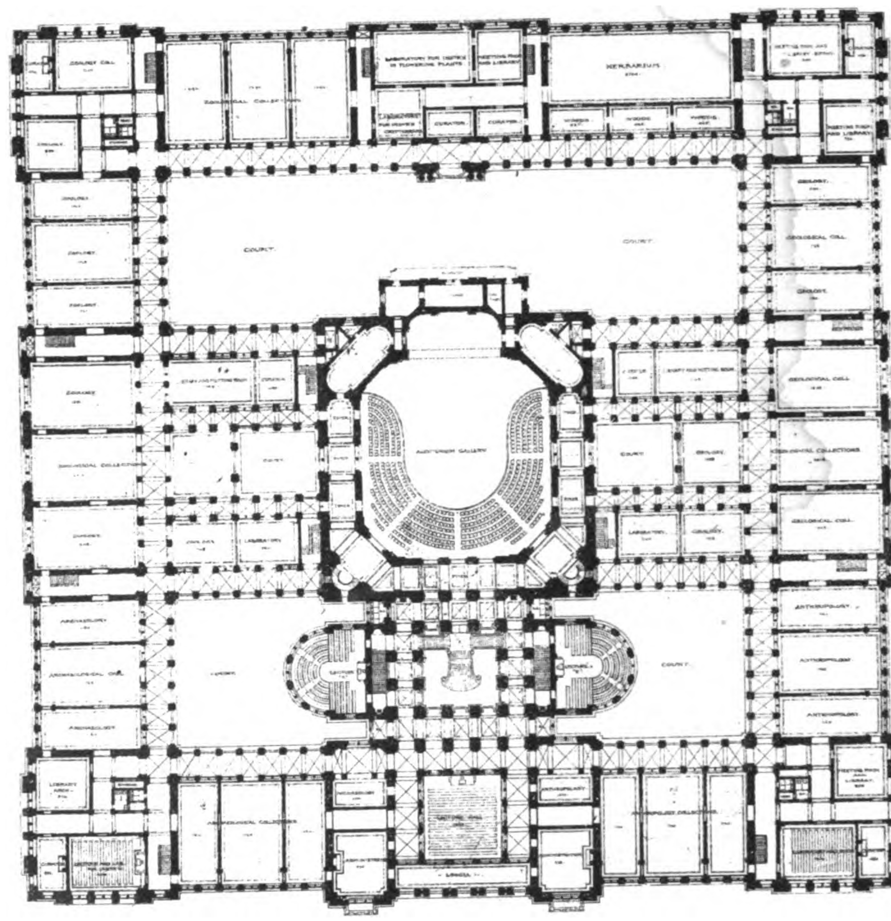

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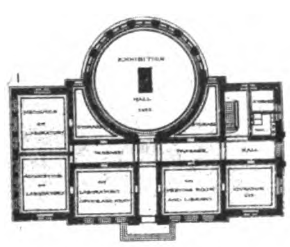

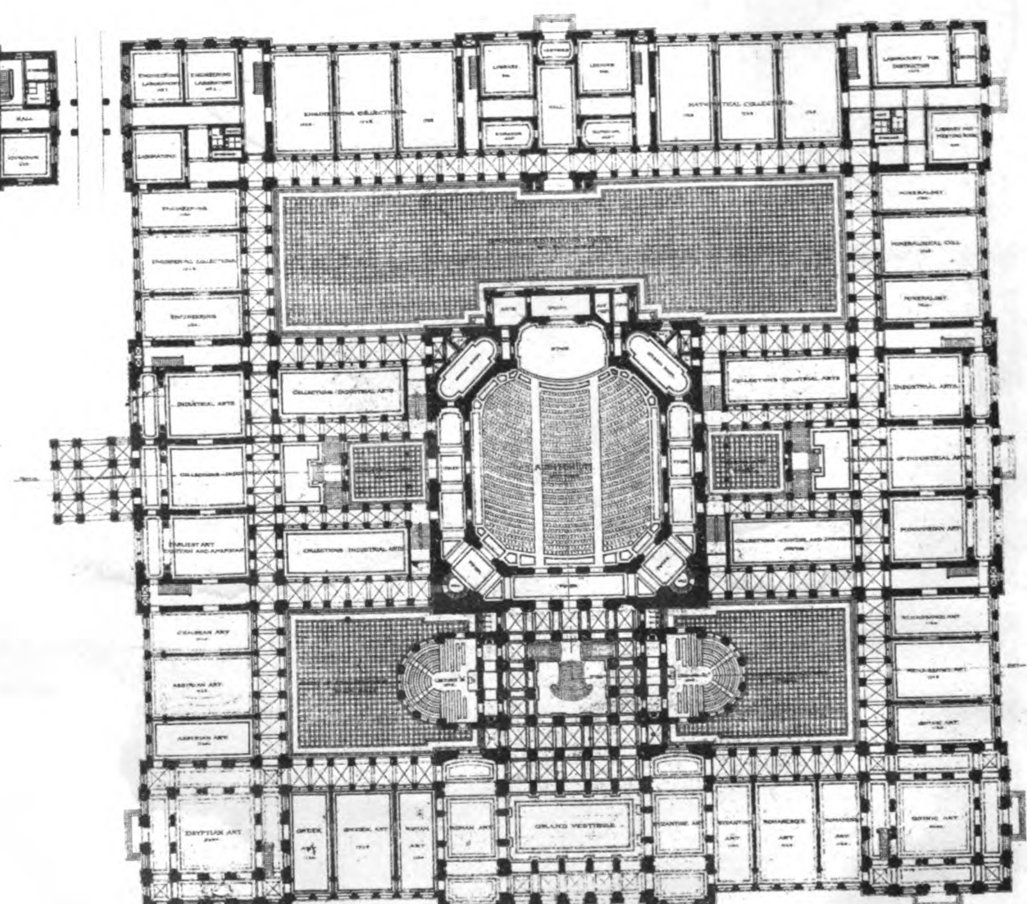

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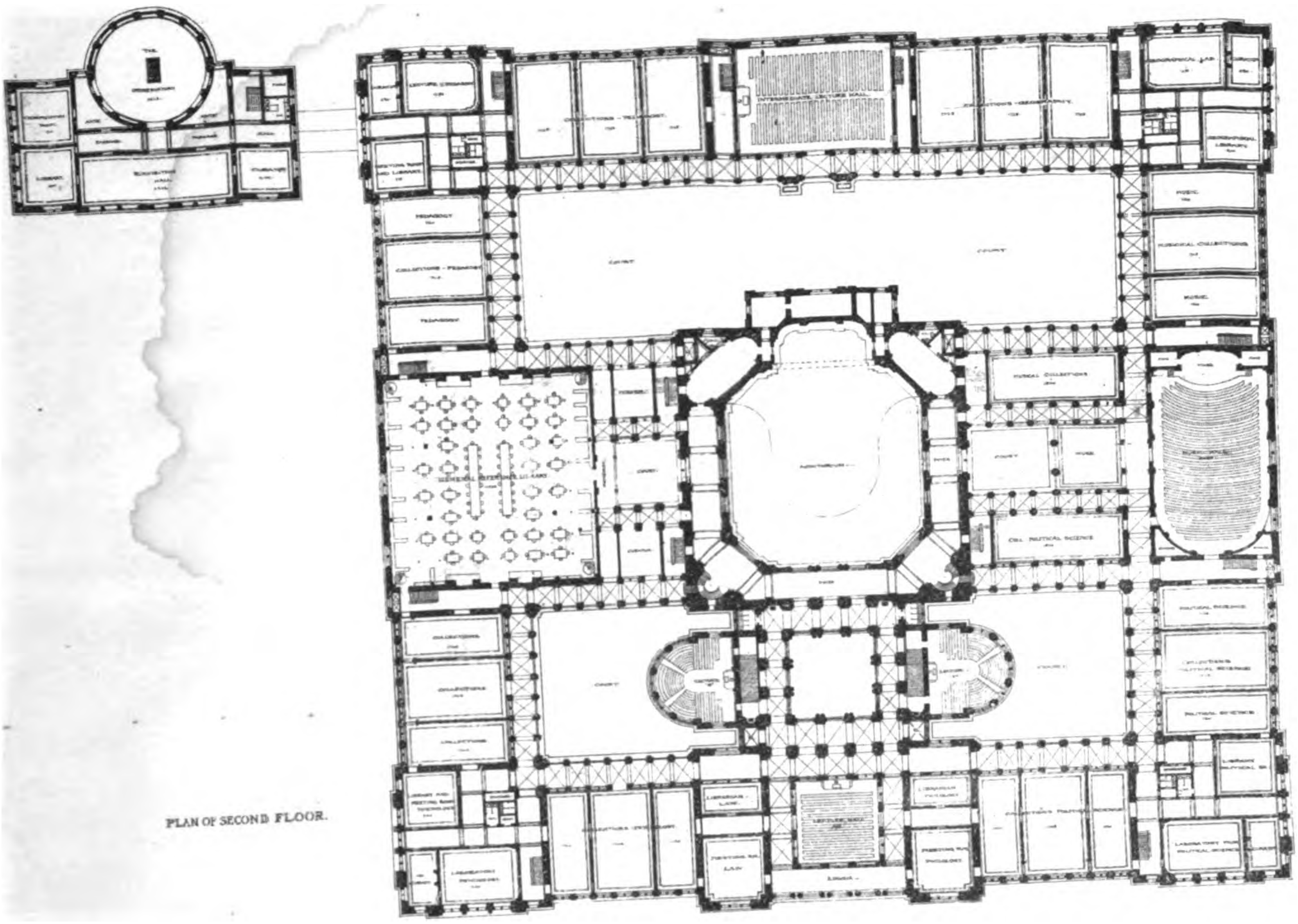

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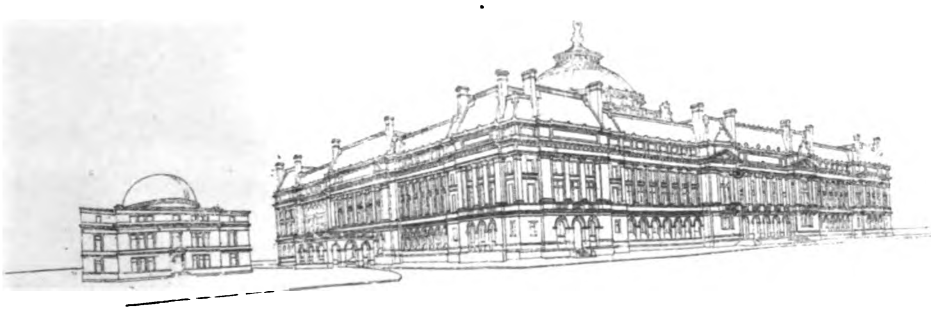

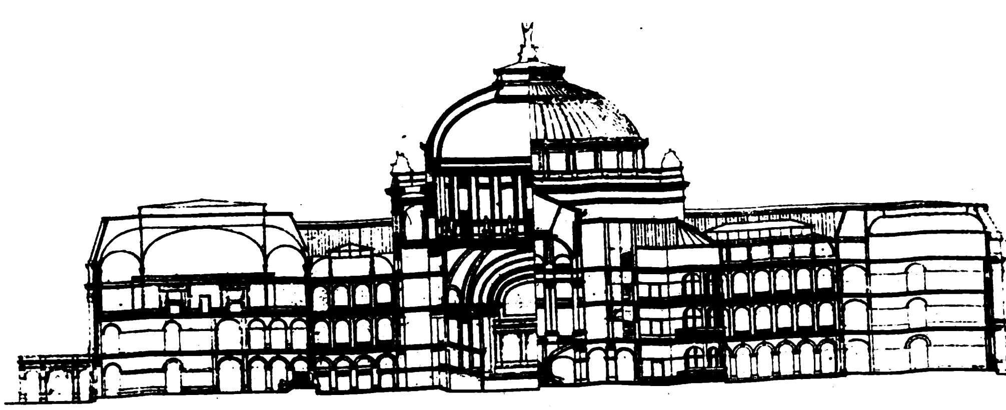

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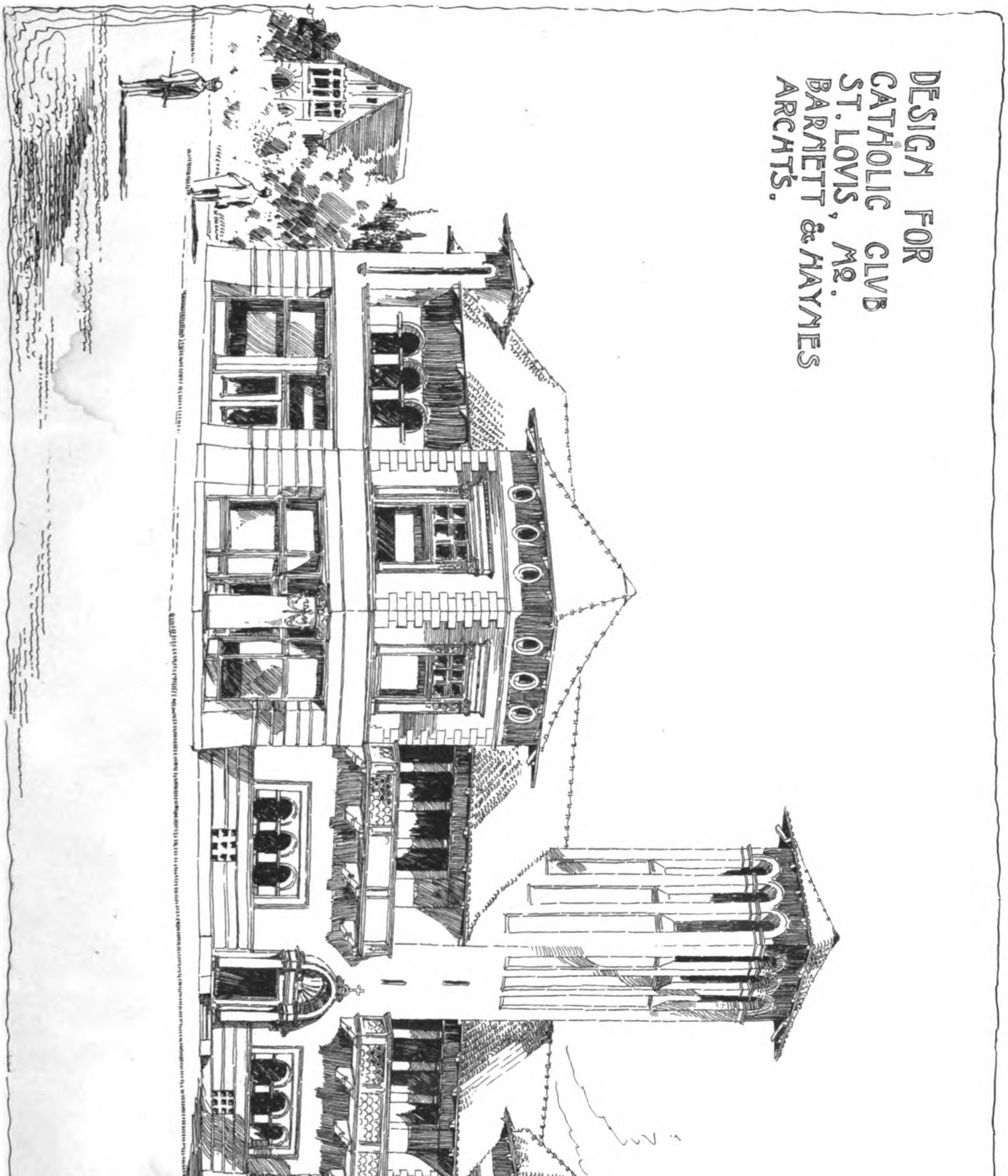

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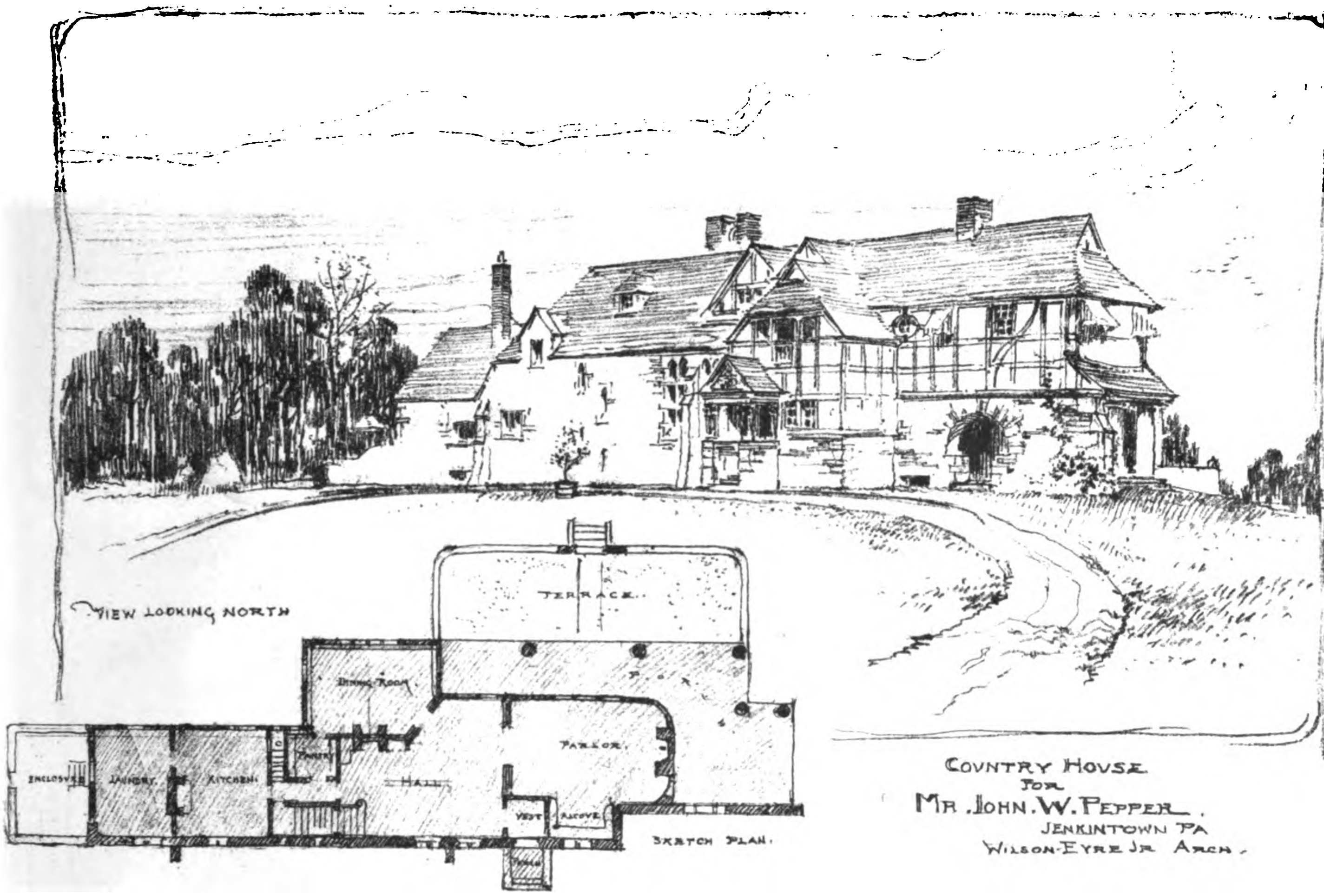

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AUGUST 19, 1893.

CONTENTS

THE New York *Tribune* has a story, which appears, from internal evidence, to have some foundation in fact, although the details have a Munchausenish flavor. It seems that about a month ago, four Californians set out from Yuma, on an exploring expedition into the Colorado Desert. They travelled for several days in the direction of the northern spurs of the Cocopah Mountains, until they came to a broken country, with rocks of granite and porphyry. Thinking that this might be a favorable region in which to look for gold, they set up a camp near a "water-hole," and began a systematic exploration. In the course of this process, one of them discovered, through a glass, some curious-looking stones projecting above the sand, far out in the desert. On further investigation, these stones proved to be carved granite columns, about eighteen feet in height, supporting granite lintels, and forming a quadrangle four hundred and sixty by two hundred and sixty feet. On the eastern side of the quadrangle were two stones "slightly curved, in a modified form of the letter S." These columns had for capitals "excellent representations of serpents' heads." Supposing that the entrance to the quadrangle might have been here, the gold-hunters dug away the sand which covered the lower part of the columns until they reached the base. Thus exposed, the stones proved to be carved in the semblance of "huge rattlesnakes, standing on their tails." The idea of a rattlesnake standing on the end of its tail, and supporting a "curiously carved capstone" on its head, is one which we commend both to naturalists and sculptors, as being quite novel. It is hardly necessary to say that this discovery encouraged the explorers to continue their researches, but beyond some more blocks of "cut granite," and some specimens of "unique pottery," they were unable to bring to light anything of interest. However, assistance has now been procured from capitalists in Yuma and San Diego, and as soon as the weather permits the investigation will be resumed.

THE Philadelphia Art Club will hold its third annual exhibition of architectural and decorative drawings in October next, the exhibition opening on the sixteenth of the month, and closing November 4. As before, drawings, either geometrical or perspective, for buildings, furniture or decoration, photographs of executed work, cartoons for stained-glass, and models will be admitted, and the Medal of the Art Club will be awarded to the most meritorious drawing, taking into account both design and rendering. Works are collected and returned in Philadelphia and New York, free of charge to exhibitors, but contributors in other places must provide for delivery at the exhibition-rooms. Entries of works must be made before September 26. Further particulars, with blank entries, and labels for works to be sent, may be had by applying to Mr. W. A. Porter, Secretary Exhibition-Committee, at the Art Club, Philadelphia.

M. HENRI RAVON, for the jurisprudence committee of *La Construction Moderne*, has something to say about the practice of requiring architects to guarantee that the expense of a given building shall not exceed the estimates. This idea, the credit of which appears to belong to the town officials of the Mississippi Valley, has, we are told, commended itself to certain French village authorities, and a correspondent, who had heard of such a proposition, asks the committee's opinion. M. Ravon, in reply, says that there is, in France, a marked tendency at present among public officials to treat the architect of a building as the general contractor for it, placing on him the responsibilities properly borne by the builder. This tendency, he thinks, is deplorable from every point of view, as well from that of the public interest as the interest of the architect. So far as the architect is concerned, the attempt, without adding anything to the very modest remuneration which he receives for his skill and trouble, and the responsibility, already heavy, which the law lays upon him, to impose upon him the burden of the inevitable risks of execution, he characterizes as "shameful," and says that it is "regrettable to see the public authority setting the example of notions so profoundly unjust."

BUT, from the point of view of the public interest, such attempts are more regrettable still. It is needless to say that no architect of character and skill would expose himself gratuitously to the risks which it is sought to fasten upon him in this way, and the inevitable result of the adoption of such requirements by municipal bodies will be to throw the designing and supervision of their building work into the hands of speculators, who are either openly or secretly in partnership with the contractors, and are sure to use their almost unlimited control over the work in such a way as to pay themselves liberally, though indirectly, for the risk imposed upon them. Nor, as M. Ravon says, can these speculators be blamed for doing so. By requiring architects to assume the responsibility of builders, they simply invite builders, instead of architects, to plan and supervise their work, and if the persons to whom their invitation is really addressed use their confidential relation as architects to put into their pockets, besides the comparatively insignificant architect's fee, a liberal builder's profit, the fault is less with them than with those who called them to this confidential relation, under conditions which made their interest directly opposite to those of the municipality which they were supposed to serve.

THE *Schweizerische Bauzeitung* describes a new process for electric welding, which is of the greatest scientific interest, and promises to be also of immense practical use. It will be remembered that Professor Thomson's process for electric welding employs currents of great volume, but low intensity, by which the pieces of metal to be joined are heated much as they would be in a forge flame, and are then made to adhere together in the usual way. This process has been brought to a high pitch of perfection, so that railroad rails have been welded into a continuous line, and it will probably always be the most advantageous method for large work; but the new process seems to offer certain points of superiority for small operations. We suppose that it will always be known as the subaqueous process, from the fact that the metals to be operated upon are submerged in water; but it should not be forgotten that its invention is due to two Belgian engineers, MM. Lagrange and Hoho, who have developed it with the help of M. Edmond Julien, the Director of the Brussels Electric Company.

IT is known to every school-boy that if the two ends of a wire are dipped in water, and an electric current is sent through the wire, the water is decomposed, hydrogen, if the current is strong enough, being disengaged in bubbles at one

end and oxygen being produced at the other, showing itself in bubbles if the wire is of gold or other metal not easily oxidized, or by the oxidation of the wire, if it is of iron. If the current is quite strong, the disengagement of hydrogen bubbles is so rapid at the cathode as to surround that end of the wire with a cushion of gas. As all gases are bad conductors of electricity, the passage of the current, when this occurs, is greatly checked, and, as any resistance to an electric current develops heat, the cushion of gas becomes very hot, and with it the end of the wire enclosed in it, and, if the current is sufficient, the metal soon melts. Even a platinum cathode can be readily melted in this way, and a carbon cathode is partially converted into amorphous carbon, a change which is known to require a temperature of more than 7,000° Fahrenheit. As the water surrounding the hot metal and its envelope of gas remains cold, the manipulations incident to the process are very easily carried on. In order to get energetic action at the cathode, with a comparatively small current, the anode is formed by a plate of metal. In practice, a piece of sheet lead is used, which is attached to the positive pole of a circuit supplied with a strong current. The negative pole of the circuit is connected with a pair of small tongs, which are provided with an insulating handle. The anode is placed in a pail of water, rendered conducting by dissolving some potash or carbonate of soda in it, and sand is put in the bottom of the pail, to catch the particles of melted metal, and the apparatus is ready for use. If a piece of iron is to be operated upon, all that is necessary is to take it up in the tongs, and dip it in the pail. The water instantly foams around it, and in a moment it is glowing. A few minutes more, and it melts, throwing out a shower of sparks. If two pieces are to be joined, they are held together under water, and in a few seconds are at the welding temperature, when they immediately adhere. No scraping or filing of the surfaces to be joined is necessary, and they need not even be cleaned, the dirtiest pieces welding as well as the cleanest. This curious, and very convenient, feature of the process is due to the chemical action of the nascent hydrogen which is evolved at the surface of the metal, as soon as it is placed in the bath, and which reduces to the metallic state every particle of oxide that it can reach. In fact, the bath can be used for cleaning rusty iron, which, after being dipped for an instant into it, emerges pure and brilliant.

ANOTHER curious thing is that, probably on account of the complete absence of oxide, metals never before welded can easily be joined. Thus copper and brass are readily welded to iron, platinum and gold may be welded together, and platinum can be welded to many other metals, while pieces of hard cast-iron may be welded together. Where it is desirable, the same process may be used for tempering steel. As this, of course, does not require so high a temperature as welding, the current is interrupted, so that the metal is heated for an instant, and then cooled, the regulation of the interruption controlling the temperature. It is often necessary to temper or harden steel articles at particular parts, leaving the other portions softer and less brittle. This may be done to perfection by covering the parts to be left soft with a non-conductor, such as clay. The current then passes only through the exposed portions, heating them, to the exclusion of the others. The process is said to be far more economical than Professor Thomson's. To raise an iron bar three centimetres square to a white heat by the Thomson process requires, we are told, 36,000 ampères of current, while by the new process the same result is easily obtained with 100 ampères. Moreover, no special currents are required. The ordinary incandescent-light current of 220 volts answers perfectly, and even the 110-volt current sometimes used for lighting works very well. Alternating currents may be used, but they have the disadvantage of spattering the water about.

THE *Schweizerische Bauzeitung* gives an interesting account of the life of Daniel Colladon, the great Swiss professor and man of science. Colladon belonged to an old French Huguenot family, which emigrated from Berri in the sixteenth century, and settled in Geneva, where Daniel Colladon was born in 1804. He was educated at the College and Academy of his native city, and, by desire of his parents, took a course of law, and was admitted to the bar in 1824; but he inclined naturally to physical science, and spent his leisure hours, during his academic course, in experiments, in company with his inseparable friend, Charles Sturm. The skill and enthusiasm of the two boys attracted the attention of the professors in the Academy, who helped them in their work, and, later, introduced them to Ampère, Arago, Dumas, Fourièr and other great lights of science, whose assistance was of great value to them. In 1825, the French Academy of Sciences offered its grand prize in mathematics for the best essay on the measure of the compressibility of water. Colladon, who had already won distinction by researches in photometry and atmospheric electricity, determined to try, in connection with Sturm, for the new prize. The two friends began their work by investigating the rapidity of transmission of sound through water, taking stations on the Lake of Geneva, from ten to twenty miles apart. These determinations gave them a starting-point for their calculations of the compressibility of the liquid carrying the sound, and, after gathering such facts as they needed, they went to Paris, where they could consider their materials, and make further experiments with instruments not available in Geneva. In 1827, after the award had been once postponed, the grand prize of the Institute was awarded to the two friends from Geneva. The next year Colladon turned his attention to steamboats, which were just being introduced, and published a description of a method by which, as he thought, an advantage might be gained by feathering the paddles of side-wheel steamers. He mentioned several ways of accomplishing this result, and was awarded an honorable mention for his paper by the French Academy of Sciences; but, presenting his invention for the Montyon prize, the expert to which it was assigned for examination reported that the system was impracticable, as the movable paddles would be incapable of resisting the blows of the waves. The prize was, therefore, refused him, but the great steamship-builders of England and France, who also examined Colladon's invention, formed an opinion of it very different from that of the Institute's expert, and immediately adopted it; and, from that time to this, feathering paddles, on Colladon's system, have been used on all side-wheel steamers of the first class.

IN 1828, a banker of Paris gathered together a small company of professors and scientific men, and informed them of his intention to found a school for the education of engineers in the old Hôtel de Juigné. Dumas, Olivier, Peclet and Benoit agreed to help him, and the École Centrale, now perhaps the greatest engineering school in the world, was established. The founders called Colladon to act as professor of physics, and gave him later the chair of mechanics. His lectures attracted many students, and did much to build up and sustain the reputation of the school. Meanwhile, he continued his experiments, devoting himself particularly to the new science of steam-engineering, and, after several years at the École Centrale, took charge of a great establishment in Paris for the construction of steam-boilers and machinery. He built on the Rhone the first iron steamboat, fitting it with tubular boilers of his own invention, and various novel mechanical devices. In 1839, he was called back to Geneva to assume the professorship of theoretical and applied mechanics in the Academy. Here his countrymen found many ways of availing themselves of his ingenuity and skill. He was commissioned to prepare a plan for lighting the city of Geneva with gas, and for restoring the bridge of the Bergues, and was made a member of the Administrative Council of the city of Geneva and of the Representative Council of Switzerland. His greatest work, however, was the invention of the atmospheric rock-drilling apparatus first used in piercing the tunnel of Saint-Gothard. It will be remembered that the compressed air used for driving these famous machines was brought from compressors placed at a considerable distance, near a stream, which furnished water-power for operating them, and many experiments had to be made on the flow of compressed air through pipes before the machines could be designed successfully. Since then, it is needless to say, compressed-air machines have been used in all important tunnels, and Colladon himself introduced many improvements in them. These services alone would have entitled him to the admiration of his countrymen, as well as of scientific men everywhere, but, in addition to this, Colladon endeared himself to all who knew him by his modesty and public spirit, as well as by his kindness to young engineers, who never applied to him for advice in vain.

CITY GATES.[1] — II.

Fig. 12. Gate of Villeneuve-les-Avignon.

BUT it was under the feudal *régime* especially, when nearly every city was exposed to the inroads of numerous tribes of Barbarians, that the Roman gate was completely transformed. From the twelfth century, all thought of opening broad ways for traffic was abandoned; it was no longer the peasant, with his load of produce, who presented himself at the city entrance, but the enemy. How to contrive means of defence — above all, how to defend the gates — became the absorbing question. The weapons of attack were, it is true, of a rudimentary sort at this time; the besiegers were necessarily compelled to concentrate all their efforts against the weak and vulnerable points in the wall or the exits. The besieged, on the other hand, comprehending that here, largely, lay the danger to them, brought into requisition all the talent and ingenuity at their command to strengthen them as much as possible. About the twelfth century, therefore, the large Roman arches were converted into narrow openings having a sufficient height to give passage to a chariot. The people shut themselves up in their cities. The gate-towers were made exceedingly prominent and exclusively defensive [Porte Narbonnaise, at Carcassonne; gate of Laon, at Coucy]. The curtains were surmounted by battlements with machicolations. The entrance was closed by two portcullises, managed from a room over the passageway; sometimes, to guard against treachery, which was not uncommon at this time, as the soldiers were usually mercenaries recruited a little from everywhere, the windlasses by which the portcullises were worked were stationed in rooms isolated from each other and protected from all external intercourse.

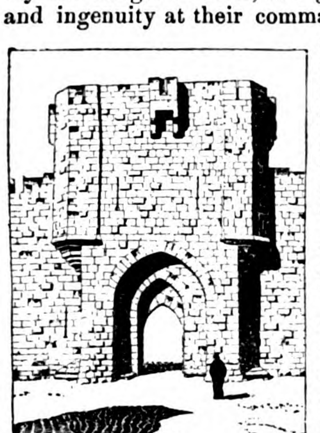

Fig. 13. Gate of Aigues-Mortes.

[1] From the French of G. Redon, in Planat's *Encyclopédie de l'Architecture et de la Construction*. Continued from No. 920, page 97.

Lastly, obstructive works were multiplied on the exterior, and assumed great importance. The gate of Laon, at Coucy-le Château [See "Château," Figs. 2, 3, 4], built about the beginning of the thirteenth century, is one of the finest of this

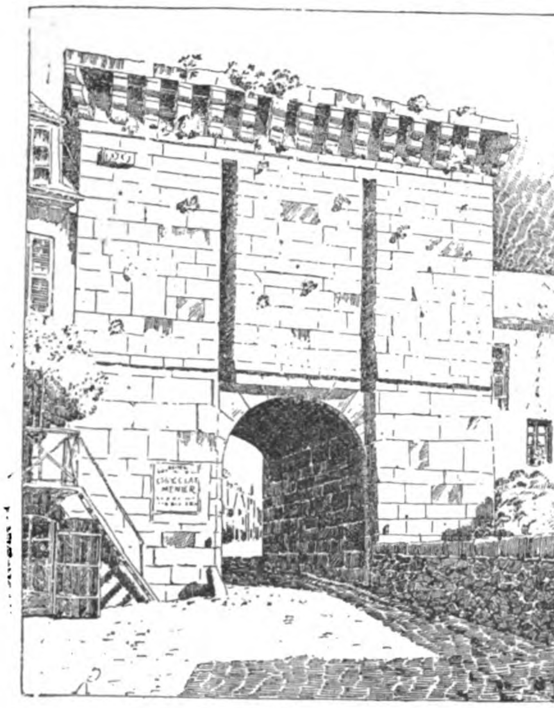

Fig. 14. Gate of Dinan.

period. It is made of limestone from Aisne, with very thick joints.

We cannot, unfortunately, go into minute details here in describing this gate or any of those to be noted hereafter. A volume would not suffice for the discussion of the ingenious contrivances invented by the builders of the time. Every-

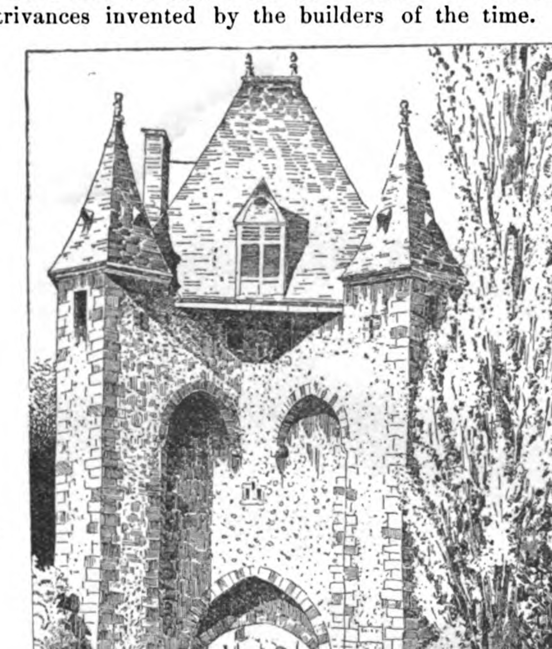

Fig. 15. Gate of Sens, at Villeneuve-sur-Yonne.

thing was new, and the military architects were called upon to solve a most complex problem; their conceptions took shape in a composition of strange and terrible aspect, imposing and grandiose, resembling though not copying the primitive Roman

type. The sections are curious and beautiful; the plans are the expression of powerfully stated demands; the façades present a *silhouette* of formidable aspect, and the rough style of construction, in small material with very thick joints of mortar, intensifies the impressive effect of the contours and lines.

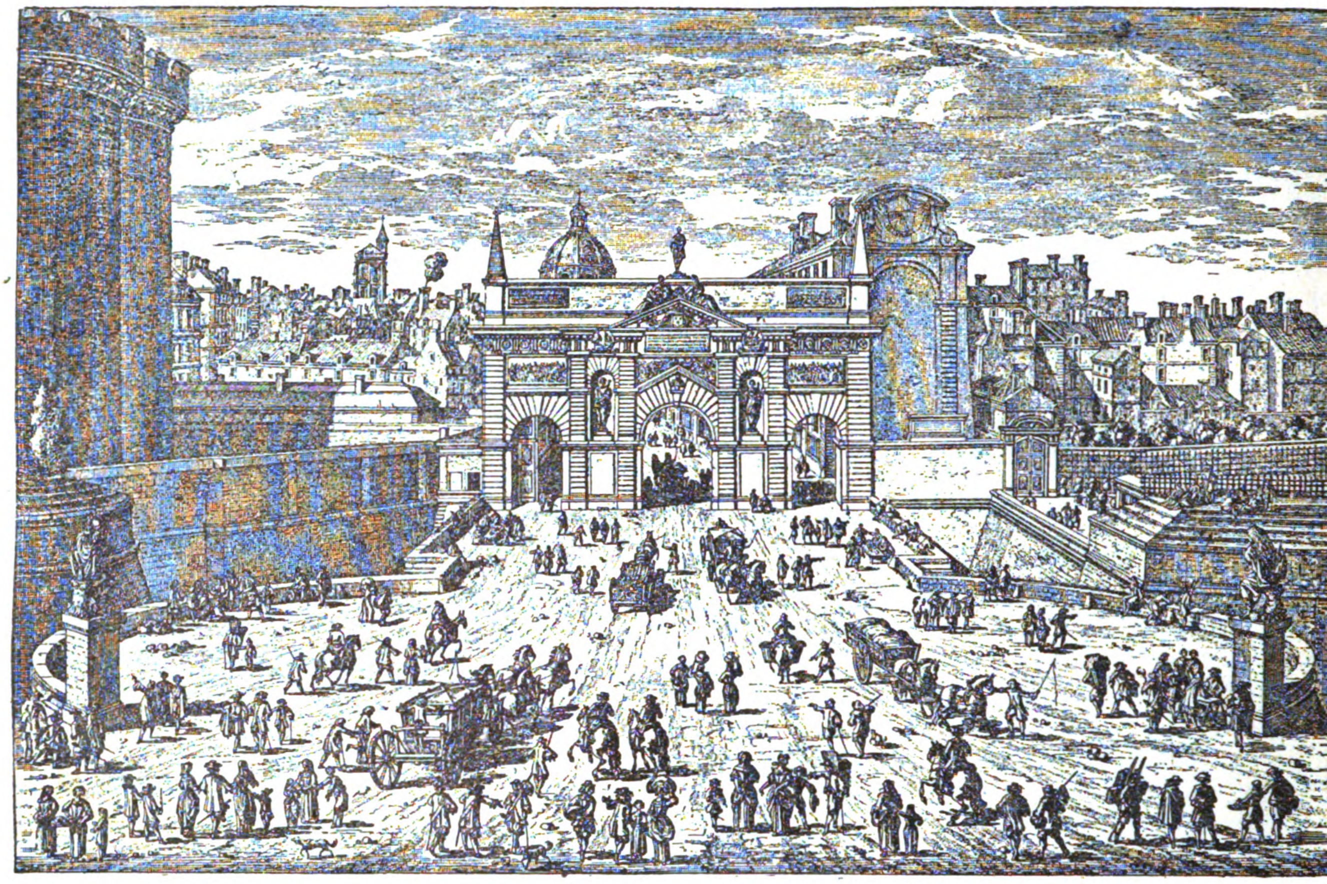

Fig. 16. Porte Saint-Antoine, Paris: after Pérelle.

Down to the close of the thirteenth century, the means of resistance seem to have been superior to those of attack, and to have been able to defy them, but, from the beginning of the fourteenth, the besiegers found themselves in possession of more effective and more perfect engines, and this led to a material modification of the character of city gates; their protection became of less moment, while, on the other hand, the external defence was better conceived and greatly developed. Bastilles appeared. The gate was looked upon as the last work to be carried; as the defensive operations were largely confined to the outer fortifications, the opening in the gate was enlarged, to enable troops to pass freely [gates of Villeneuve-les-Avignon, Guérande, Chartres, Villeneuve-sur-Yonne, etc.].

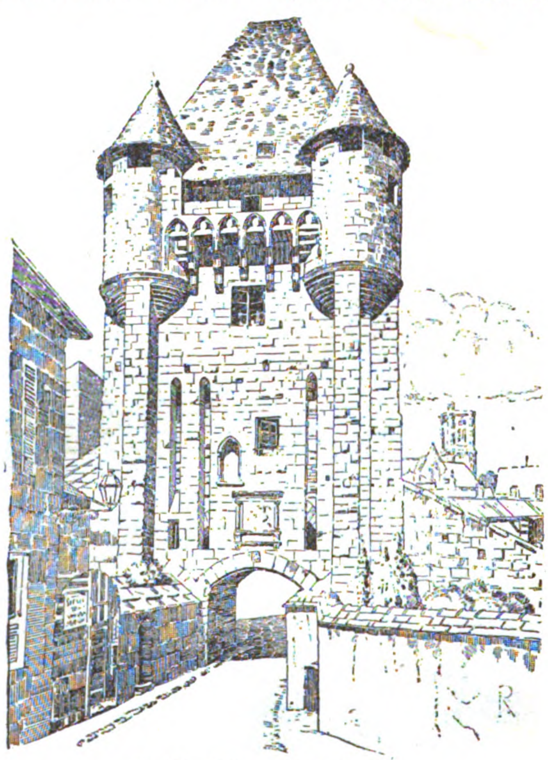

Fig. 17. Gate of Croux, Nevers.

The gate of Villeneuve-les-Avignon, erected by Philippe le Bel in the latter part of the thirteenth century (Fig. 12), is an excellent example of the gates of this period. As in the gate of Laon, at Coucy, the style is monumental and imposing. The crowning produces a very striking effect. In the centre may still be seen the remains of a square châtelet over the platform, which commanded the approaches to the entrance. This beautiful structure is of Villeneuve stone.

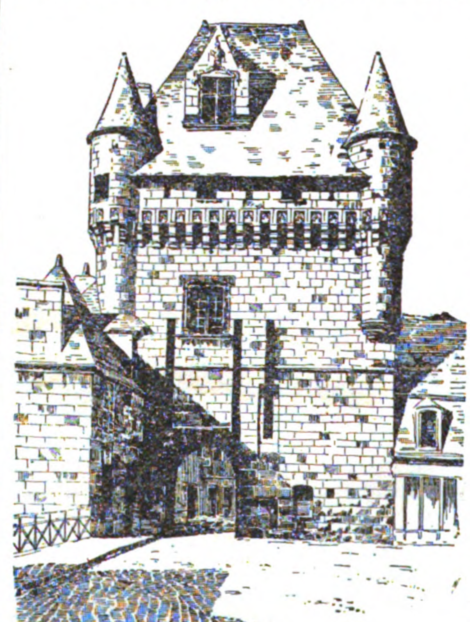

Fig. 18. Gate of Loches.

From the same period dates also a type of gates with one exit pierced in a square tower, which was neither flanked by towers nor guarded by watch-towers; for example, the gates of Aigues-Mortes (Fig. 13), Carpentras and Dinan (Fig. 14).

The exceedingly original gate of Villeneuve-sur-Yonne (Fig. 15) likewise belongs to the early part of the fourteenth century. It is most ingeniously disposed, with two huge oblique

machicolations, which protected the drawbridge, and through which its chains undoubtedly passed. It is built of rough limestone, with hewn stones at the angles.

The famous Porte Saint-Antoine (Fig. 16) dates from the close of the fourteenth century. It had formed a part of the Paris fortifications known as the enceinte of Charles V. It existed in its original form until the end of the sixteenth century. It was adorned with statues when Louis XIV made his solemn entry into Paris in 1660. A triumphal arch had been erected in front of it on the occasion of the return of Henry III from Poland, September 14, 1573. The arch itself was decorated in honor of Louis XIV, and the architect, Blondel, was afterward commissioned to restore it. The restoration was not completed until 1672, and it was demolished in 1778.

The gate of Croux, at Nevers (Fig. 17), belongs to the fifteenth century. It is an interesting specimen of gates with watch-towers, but without ordinary towers. One can still see the two large grooves for the drawbridge and that of the postern. The entrance could be defended from the machicolations with stone consoles in the centre and from the watch-towers.

We give, also, a sketch of the beautiful gate of Loches, a variant of the preceding type (Fig. 18).

[To be continued.]

FIREPROOF CONSTRUCTION AND THE PRACTICE OF AMERICAN ARCHITECTS.[1]

Gateway to a Bohemian Farmhouse. From *Architektonische Rundschau.*

IT would be futile in the short space of time allotted for the papers to be read before this Congress, to give a treatise on fireproof construction. I will not assume that you are not well versed in the subject both by study and experience. You may have studied it faithfully from such sources as are attainable and many of you may have theories of your own which you have put into practice as occasions have offered. Your experience has in some cases been satisfactory to yourselves, but in many cases unsatisfactory; and the reason why I propose to suggest.

The architects of America, and especially those of Chicago and other interior cities, have had a large experience in this *practical* branch of our profession of late, and on that account I propose to confine myself to the practice of American architects rather than to the theory of fireproofing buildings.

So much has been written on the theory, so many new and old inventions have been exploited, that it is useless to reiterate to those who know. But it is of the utmost importance that those who wield the sceptre and control the use of such inventions should do so with a full understanding of their relative values. Architects who may be entrusted with such a responsibility should lose no opportunity to inform themselves thoroughly about everything pertaining to this subject. There are often valuable inventions which fail to meet approval because presented in an impracticable way, the authors of which claim for them more than they deserve, and thus disgust you with their reiterations; and frequently inventions which on the slightest investigation will prove to be not only useless, impracticable and expensive (notwithstanding protestations to the contrary) are presented for your consideration with a flourish of trumpets and a display of credentials and testimonials calculated for the time to prevent any attempt at investigation. Between these two kinds you should weed out the grain from the chaff.

Every invention that is good and successful will soon encounter a rival which makes claim to being superior and less expensive. These two claims are generally inconsistent. The most common errors of American architects have been in the direction of encouraging what are vulgarly known as "cheap and nasty" inventions. But notwithstanding this the great progress and development of the art of fireproof construction during the past ten years or more has kept pace with the development of the higher — that is, the artistic — education of the profession. And while I have nothing but praise for what has been accomplished, I cannot bestow it without reminding our American brethren that they have not been without their shortcomings, and that they have only been through a period of preliminary practice. They have done much that should be avoided and discarded in the future, and omitted much that there is no excuse for omitting, except inattention and indifference to the essentials of complete fire-protection.

The art of architecture in America has been raised to such a high plane, that nothing should be omitted to make structures that are worthy to be seen for all time, sufficiently durable to last for all time. The fireproof building in which wood is discarded for all constructive purposes can still be attacked by the ravages of fire. It is fully as important that it should resist fire as that its foundation should resist settlement, its piers refuse to be crushed or its floors to sag.

It is assumed that we are all now agreed as to the essential elements of a fireproof structure. I think it was in 1871 that I first suggested what these should be from the architect's standpoint in an address before the American Institute of Architects. These are: that all constructive materials should be incombustible, that iron and steel should be protected from such a degree of heat as would weaken them, and that combustible material not used for construction should be discarded as much as possible. None of these requirements are inconsistent with good architecture, and the same conditions exist as before. I may be repeating what I have said on other occasions when I say that the main faults of omission of modern architects arise from an inability to realize the intensity of heat in burning buildings, and the manner in which fire spreads. Whatever I may know on the subject, I ascribe to an early habit of running to fires and a fondness for groping around ruins, before I ever thought that this would be part of my own education. The professional fireman is fully aware of these things, but he is always a bad critic of fireproof construction, because of his want of education in the technical matters that pertain to it. For whenever a building supposed to be fireproof is injured by fire he condemns it *in toto* because he is not well enough informed to see the weak point in its construction or arrangement. He treats all buildings alike and naturally regards them all as food for flames, because all that he has any experience with have some radical defect that he does not see. But when he condemns them in detail you should listen to him. He is not, however, the man to suggest the remedy, that is for you to do. Scientific investigation on practical lines will lead you to it.

Before 1870, iron in all its forms was considered by architects to be a fireproof material. Buildings erected before that time were called fireproof if the vertical supports and floor-beams were of unprotected iron, the floors built of brick, and the roofs of wood supported on iron trusses, all other parts being combustible as before. In some, cast-iron joinery was substituted for wooden joinery at great expense, but still the constructive iron was unprotected. A large number of such buildings were erected in the seaboard cities, and nearly all public buildings received similar treatment. One of the most important Government buildings, namely, the State, War and Navy Building, at Washington, which was nearly twenty years in course of construction, was built in this way, right through a period when great improvements were being introduced elsewhere.

From 1870 to 1880 an improvement was seen in fireproof interior construction in only a very few of the many so-called fireproof buildings then erected. The greatest advance was made from 1880 to 1890, and it was during this period that the interior of the country — commonly called the West — took the lead. This is the period to which I intend mainly to refer.

Before 1871 there were few occasions of disastrous fires to prove the inefficacy of the insufficient means that had been taken to render buildings fireproof by simply substituting iron for wood. I remember only two in this country — one was a building owned by the Singer Sewing-Machine Company on the east side of New York, that was leased for various manufacturing purposes, and the other was the Fulton Bank Building in the same city, both of which were totally destroyed by fire. Besides these there were two in England, one being part of a storage-warehouse in London and the other a mill at Oldham, the destruction of which was described by the late R. G. Hatfield at one of the Institute meetings. But in the great Chicago fire of 1871 all similar buildings that were in any way attacked by fire, went down before it. It was this that awakened a general interest in the subject.

Before this time there were no experts in fireproofing. All of such works were done by builders, and the architects made their own specifications. But the Patent Offices of England and France had on their records many valuable inventions of fireproof construction, unused except to a slight extent and mostly for experiment in those countries, and not at all in our own. The late George H. Johnson was the first to patent fireproofing inventions of any value in this country, but he never reaped the reward of his ingenuity. He came to Chicago in 1872 and constructed the interiors of several buildings with hollow fire-clay tiles. But it was not a successful business with him, and he died before his system came into general use, to be succeeded by his son, E. V. Johnson. About the same time Leonard H. Beckwith, a New Yorker, who had been educated as a civil engineer in France, came from that country and organized a company in New York to introduce the French system of interior fireproof construction. The materials he used were hollow blocks of plaster and cinders, the plaster being reinforced with a small amount of French cement that had an affinity for plaster-of-Paris. His system was an improvement on that used in France. Mr. Beckwith advocated the covering of iron constructions

[1] A paper by P. B. Wight, Consulting Architect, read before the International Congress of Architects, Chicago, August 4, 1893.

with his material, but obtained very little encouragement in this from the Eastern architects. He was the first practical expert in fireproofing in America who put his inventions into extensive use. He procured a license from Johnson to use his patents, and it was not until he substituted burned-clay hollow blocks for the plaster blocks that he did any work that was successful and permanent. Mr. Beckwith made his own specifications, which were acceptable to the Eastern architects, and carried out his own contracts. The business was profitable until other manufacturers began to imitate his material and put it on the market to the general contractors. This continued for a while until without wisdom or forethought his company offered material for sale in competition with that of its competitors. Had he not done this there were enough sensible architects who would have thrown their influence in favor of work done by an expert. But from that time the architects ceased to consider him as an expert, he became only a material-dealer, and in a few years the company failed. From that time New York has never had a fireproofing expert, and consequently but few improvements were made in the East until the architects began to copy methods employed in the interior, and those which were used by Chicago specialists and contractors in New York.

The rebuilding of Chicago after the great fire was hurried work. The terrible destruction that had been wrought discouraged those who might have attempted to rebuild in a fireproof way; that and the necessity for rebuilding quickly gave reason for abandoning fireproofing. But another valuable result followed. As they had confidence in bricks, new party-walls were generally built much heavier than before. In consequence, fires in the business structures of Chicago have rarely extended beyond those in which they originated. The *Tribune* Building and the First National Bank were rebuilt as they were before the fire. The Kendall Building, afterwards called the Equitable Life Building, was the only one in which any improvement was made, and was fireproofed on Mr. Johnson's system, so that from 1871 to 1880, this and the new Court-house and City-hall were the only fireproof structures erected.

We now come to the period between 1880 and 1890, distinguished alike for the advance in æsthetic culture and scientific construction. For this the greatest credit is due to our home architects, for it was not until scientific experts had demonstrated the value of inventions long unused, and added to the list others that were much needed, that capitalists began to appreciate the fact that buildings really fireproof could be erected. The perfection of the manufacture of ornamental terra-cotta gave also a material for exterior use that could be called reasonably fireproof. Until then investors had been unwilling to put money into exterior ornamentation that was so easily destructible through the burning of a neighboring building. I know of no one to whom I would give more credit for an intelligent appreciation of the advantages of really fireproof structures than Owen F. Aldis, of Chicago, who then, and until now has, directed the investments of the Brooks family, of Boston, amounting to several millions of dollars, in buildings in the City of Chicago. In this he has been ably assisted by the architects whom he first employed, Daniel H. Burnham and his late partner, John W. Root. The example they have set has been followed by all the leading architects of Chicago and other interior cities, notably by those of Cincinnati, St. Paul and Minneapolis, and later by those of Pittsburgh and St. Louis. This fireproofing system is based on the use of one, and only one, material, namely, hollow fire-clay blocks for all interior and roof constructions, and the protection of iron and steel. These blocks are made either of dense or porous material, but always of clay, and the best of them of fire-clay. I reject everything but clay for fireproof structures. To assume that a material is incombustible does not prove that it is fireproof. Clay is the most plentiful material on the face of the earth, and so cheap that it is not necessary to look for anything cheaper. A great advantage that it has over concrete made of hard cements, so much used in Europe, is that it can be made so much lighter, while I do not think a comparison is admissible with all the various compounds of which calcined gypsum or common plaster-of-Paris is the main ingredient. Therefore, in speaking of fireproof buildings, I will refer only to those in which clay or fire-clay is the material for interior construction and terra-cotta for exterior adornment, with walls of brick or steel construction enclosed with brick.

The use of steel foundations, and later of steel-framed constructions, are the natural outcome of the use of light hollow fireproof blocks. In order to build fireproof structures and make them pay, they must be many stories higher, so as to decrease the relative cost of the land to the improvement. Building higher on compressible soils necessitated economy in weights. Hollow materials *only* made this feasible. It was then found that the heights of buildings could be increased more and more by using steel frames, but only in case those frames were protected by the light fireproof material. Hence the latest and most improved buildings contain very few bricks, the exteriors being of cellular terra-cotta, and the interior faces of the exterior walls of hollow fire-clay blocks.

The number of these structures and the extent to which this system has been used is well known to all of you, and therefore I need not particularize the great number of buildings thus erected; and while you who are of this country have certainly done your part in them, you may well ask now: "How did this all come about?" I will answer that, at first, it was by the employment of contractors who were experts. You will generally admit the importance of departmental work in architectural practice, but it has not been customary to employ experts in fireproofing when the contractors were experts. What, then, have you to do if the contractors are not experts? If you trust yourselves to their advice, you will simply subserve their interests, and not those of your clients. The only solution is that you must become experts yourselves or employ those who are.

In this review of American architectural practice in the department of fireproof construction, I am obliged to record my observation that the last decade has not always been marked by progress, and, unless you become as well versed in the details of everything that pertains to this subject as the expert contractors, you may fall into serious errors.

In my own experience as a contractor for fireproofing, which terminated two years ago, I have read hundreds of specifications for fireproof work, in but few of which what was needed was clearly expressed. You were obliged to trust to the contractor for what you wanted, and that was all very well as long as your contractor was an expert in the art, and received a price which he considered fair and remunerative. But when he was not an expert you had trouble. The demand for competition brought those into the business who were not experts in the use of fireproof materials, but simply had facilities for making them.

Fire-protection is a scientific study which requires not only a knowledge of the cause and effects of fire, but a thorough knowledge of all the systems and details of building-construction and a keen eye for the dangerous adjuncts that are constantly creeping into modern systems of building. Among the latter are the extensive use of piping of all kinds, which, unless skilfully managed as part of the original plan of the structure, may not only become the means of great disfigurement, but weaken the construction of those parts which are of fireproof material and open up avenues for extending a conflagration. The fireproof materials are required for three principal uses: First, for the construction of floors, of which there are many methods; second, for the building of walls and partitions, and, third, for the protection of isolated constructive members. The man who is most competent to build a fireproof floor is he who is equally versed in the properties of steel and burned clay, and has had experience with both. He who can best plan and describe walls and partitions must have full knowledge of their statical conditions, bearing-strength and lateral stiffness, and must know all the devices for keeping them in place and securing doors and windows to them in the best manner. He who can correctly specify the proper method for protecting steel or iron columns, girders and trussed constructions must have a large range of experience in all the methods that have ever been used, and the best shapes for the purpose that are practicable to be manufactured. The worst blunders of contractors have been in this department, and badly-planned, careless and indifferent work, when put to such a test as was recently given in the building of the Chicago Athletic Club, is calculated to bring discredit not only upon contractors, but architects as well, and to shake the confidence of the community in the whole system of fireproof construction.

The attention now given to steel constructions, if given to these matters, would soon result in very scientific work being done, so that, when it is put to a test by actual experience, we would have no more of the croakings and speculations of amateur critics and reformers.

The proper fireproofing of a building is not alone a matter of the selection of materials. It enters into nearly every feature of the plan. A building may be reasonably secure against accidental fire or the extension of a fire once started even if no special fireproof materials enter into its construction. This result is attained by cutting off communications as far as possible, being those unseen as well as those visible. The former are the numerous pipe and air passages, always so difficult to manage, and the latter the stairways and elevators.

Many years ago the Harper Publishing House in New York was erected when fireproofing was in its infancy, but it did not contain a stairway or elevator, these being placed in towers in the court. A similar result has more recently been obtained in a building in New York for the American Bank-Note Engraving Company. This is practically two buildings fronting on two streets. Two connecting parts contain all the stairways, elevators and rising-pipes, thus leaving a square court in the centre. The connecting buildings are shut off by reliable doors from the main buildings. This double system is essential to convenience and safety. We have a similarly-planned building in Chicago, namely, Gore's Hotel, but not quite so good as the Bank-Note Building, as it is not provided with cut-off doors. Buildings planned thus are not in need of exterior fire-escapes. The two last mentioned are not built with steel floor-beams, but both are thoroughly protected. The words "slow burning" are not applicable to them, but refer only to buildings constructed with heavy floor-beams and thick plank floors, and not considered in this paper as fireproof buildings in any sense. All three of the above-named buildings are good examples of arrangement for safety against fire.

Referring now to the class of buildings described as "partially fireproof," I desire to say in this connection that I do not recommend this system of building. It is only resorted to, to save the expense of using incombustible materials entirely. It is not always reliable

and we have had experience to lead to this conclusion. This has shown that it is reliable only in some cases. One building, the Wilshire, in Cleveland, has been on fire twice and has been saved by it in both instances. The ceilings were made of porous terra-cotta blocks of the best manufacture, shape and method of application, all the blocks being secured with screws and countersunk plates of iron. The large store-building, corner of Wabash Avenue and Adams Street, Chicago, now occupied by Revell, was saved from a very severe fire in the upper story. It is of the same construction and material. The Lumber Exchange at Minneapolis was totally destroyed. The ceilings were all of porous terra-cotta, but bad in shape and method of application, the blocks being fastened with nails and tin washers, exposed. The *Tribune* Building in Minneapolis was totally destroyed. The ceilings were of thin fire-clay slabs of the best form and method of application, but for several years after it was built they had been tampered with in making alterations and putting in machinery, and parts of them had been removed. It is proper to say, however, that two previous fires had been easily extinguished in the same building, the confidence inspired by which led to serious loss of life when it was burned at last.

In a thoroughly fireproof building it is not alone necessary that the materials of construction shall be incombustible and covered with burned clay. (1) The clay used in the manufacture of the fireproofing material must be of a certain kind. (2) The forms of the pieces and the method of putting them together and securing them in place must be based on scientific principles, and the experience of those who have studied the subject.

The clay must be of the refractory kind, that is, it must be either a plastic fire-clay, a semi fire-clay, or a fire-clay mixed with a plastic clay or shale. The best fire-clays are too "short" for this purpose and too brittle if highly burned. In the manufacture of porous terra-cotta very few clays have been found that are both practicable for making a good article and reliable to resist fire when in use. So far as I know they have only been found in three places: Brazil, Indiana, Chaska, Minnesota, near Minneapolis and St. Paul, and some parts of Eastern New Jersey. For the manufacture of hard fire-clay material, proper clay can be found in many localities. The best that I know of are in Utica and Ottawa, Illinois, St. Louis, Missouri and the Eastern clay-belt of Ohio, where they exist in the greatest quantities. They are all white and buff clays — the buff clays being preferable on account of their toughness. No clay that burns red or salmon-color is fit for a fireproof building-material. Of this I am positive. The greatest errors of American architects have been in the acceptance of so-called fireproof materials made of inferior clays.

The form and method of assembling and securing the fireproof clay materials are the next essential considerations. They involve many principles of construction and provision against expansion, a description of which the limits of this paper will not admit. In securing the material to constructive steel and ironwork many mechanical expedients must be resorted to. The avoidance of these expedients rather than their too extensive use is to be sought. This can be obtained by forms of material that are to a certain extent interlocking, and a special study is often required in new cases constantly arising. I have often seen in specifications the requirements of mechanical expedients or fastenings, with iron straps and bolts where they might best be avoided, and too much of the same in practice. It is too often forgotten that it is useless to employ for fastenings the same material that we are trying to protect. As a general principle, where metallic fastenings or hangers are necessary, they should always be either concealed within the fire-clay or covered with mortar. All suspended fireproofing should be secured from the back or edges. As an illustration, the common form of roofing with ⊥ irons and book tiles is not a fireproof construction and will sag and fall from slight exposure to fire on the underside, though thoroughly fireproof on the upper surface. It should not be used unless protected by a suspended fireproof ceiling, all communication with the intervening space being permanently cut off. As a further illustration, all girder-covering supported by straps or bands on the outside is useless, and all wooden blocks built into fireproof material should be avoided.

This is but a slight sketch of the essentials of thorough fireproofing, such as have been complied with in some of the many fireproof structures that have been erected in America during the past twelve years. I will not attempt to describe these buildings, which it is also quite useless to enumerate, as there are so many of them, all differing in degrees of excellence. I only wish I were able to say that in our practice there had been a gradual progression from good to better. There is always room for improvement, and it is almost as injudicious to remain stationary as to take up with nostrums that are constantly parading to attract our attention. We have worked on good lines and accomplished good results, and notwithstanding that some of us have made mistakes there is no reason why we cannot avoid them in the future. I have endeavored to show that expert knowledge in this branch of your work has too often been unheeded, that experts have not been encouraged as they should be, and charlatans have, as they should not be. This is an error easy to correct, and the solution of it is that you should either become experts yourselves or employ those who are. The practice of architecture calls for expert knowledge of almost everything under the sun. None of us can possess it all and hence it has been the custom of offices having large practice to adopt a department system for the division of office-work. I think that where this is done the subject of fire-protection has been too often neglected. This is only a little fault of omission that can easily be corrected and I hope that I have been of service in calling your attention to it.

A REVIEW OF RECENT PLUMBING PRACTICE.[1]

Gateway to a Bohemian Farmhouse. From *Architektonische Rundschau.*

THE methods of planning and jointing pipe and setting fixtures in plumbing a house fifteen years ago are interesting, as showing the lack of intelligence, both of the designer and the workman, at that period. Terra-cotta pipes were used under buildings. The joints for branches were usually made by pecking a hole into the larger pipe and inserting the small one. No care was taken as to alignment of the whole. The spigot-ends of the pipe were inserted into the hubs carelessly as to contact, level or grade, and often without cement.

Old house-sewers of this date, when taken up, have been found invariably acting as conduits for and distributing filth through the joints into and contaminating the soil beneath the house.

Cast-iron pipe, when used, was then uncoated. For bends and branches there were few fittings, the ordinary method of branching being similar to that adopted with the terra-cotta, pecking a hole and sticking in the end of the small pipe, thus forming a projection on which foul matter could collect. The joint was covered with putty. Piping systems were never tested. The only tight joints made during this period were where lead soil-pipes were used with wiped joints, the work being done by some old English or Scotch plumber.

No system of pipe-trap or local ventilation was in use. The pan-closet, with its large concealed receptacle for filth, was used everywhere. All plumbing fixtures were concealed by woodwork, with numerous dark and inaccessible places, in which the germs for filth-diseases had a quiet and uninterrupted opportunity to breed. Fifteen years ago there was no literature on the subject, except a little in books on engineering or water-supply, and the only way in which an architect could inform himself was to get instruction from the most intelligent plumber of his acquaintance, or begin the study of the appliances and practice as he found them, and improve on such methods according to his common-sense, his mechanical or scientific ability.

One of the first efforts to call attention to this lack of knowledge was a series in the *Atlantic Monthly* by George E. Waring, Jr. The first articles, published in 1875 and continued in 1878, advised reform and advocated an open soil-pipe. Following this, in 1878, T. M. Clark wrote quite a practical series for the *American Architect* on "Modern Plumbing." By this it can be seen that the civil engineer and the architect instigated the reform. These articles, and articles in the *Sanitary Engineer* about the same date, were the first to advocate trap-ventilation, the *Sanitary Engineer* giving a section of a house with all traps vented. The literature on the subject since that time has increased, but there is still a decided need for a thorough work on this topic.

S. S. Hellyer, a prominent dealer in plumbers' supplies, a manufacturer and plumber in London, has written two practical books from the English standpoint — one in 1880, another in 1882 — in which the methods and advice given are good, but he gives simply an exposition of the English way of doing the thing.

P. J. Davies (1887), who is another English manufacturer and plumber, has put upon the market an elaborate work on plumbing as he thinks it should be done. This book is full of crudities, bad methods and poor advice as to appliances and arrangements, Mr. Davies being a man evidently full of his own wrong ideas and determined to enforce them.

W. P. Buchan (1876–1883), a Scotch plumber, gives in his book a short practical account of the English, or Scotch, methods in vogue, with little effort to make his book more than an elementary treatise.

The writers on the subject in England (with the exception of Latham and Denton, who devote to plumbing a portion of their works on sanitary engineering) have been tradesmen, not professional men, and the books lose for this reason, not having the breadth, scope or literary qualities that might be expected from a professional or scientific man. Hellyer's books are still the best exposition of the English practice, being confined practically to methods of lead-piping and descriptions of English appliances. The only modern French work on this subject is F. Liger's "*Fosses d'Aisance, Urinoirs et Vidanges.*" This gives a thorough description of the peculiar

[1] By Glenn Brown, F. A. I. A. Prepared for the Convention of the American Institute of Architects. Read by courtesy of the Institute at World's Congress of Architects at Chicago, August 4, 1893.

contrivance used at the time (1872) in France—a large sheet-metal pipe extending from closet to a large barrel or other movable receptacle. This portable cesspool, when full, is removed. The peculiar apparatus for separating fæcal matter from the urine, showing how the urine escapes in sewers, is shown, and how the barrels (*fosses mobiles*) are removed. The apparatus and disposal appear peculiarly antiquated, while the odors which arise from them must be intensely disagreeable. The arrangements described, I understand, are still largely in use in Paris. Other foreign literature on the subject is of little, if any, practicable value, except as a means of calling public attention to vital matters, and consists either of books or pamphlets by alarmists like Dr. Pridgden Teale ("*Dangers to Health*"), or by physicians who do not understand the practical side of the question, or by inventors or manufacturers who desire to push their wares.

In America, the writers are limited to George E. Waring, Jr., E. S. Philbrick, T. M. Clark, J. P. Putnam, W. P. Gerhard, J. C. Bayles and myself. The plumbers in this country have done nothing by way of adding literature to advance the trade, and in many instances they have opposed such advances.

The books published in this country do not give more than an elementary or partial treatment of the subject. The majority of them discuss it only from a sanitary standpoint. Mr. Clark's articles, already referred to, are simply a short series, covering the ground in only a general way. Philbrick, in his book, treats the subject only as an incident to American sanitary engineering. J. C. Bayles writes principally of hydraulics and water-supply, ignoring what we would call plumbing proper, although the title of his work would indicate a treatise on plumbing. Waring's and Putnam's books are largely descriptive of their own inventions, many of which have excellent points, but, in a treatise on the subject, should probably take less space than has been given them. W. P. Gerhard has written three small works on house-drainage which constitute the best American treatment. These books are small, and cover the ground only in an elementary way, and principally point out the availabilities from a sanitary standpoint. He practically avoids in his works the question of trap-ventilation. The book I have published describes simply the one subject in plumbing—water-closets—and the pamphlet that of trap-siphonage.

We have no book descriptive of American plumbing of the same thoroughness that the work of Hellyer gives to the English practice, and at present there is no book which gives more than a partial, local or very elementary discussion of the trade as practised in our own and other countries. Among the magazines the *Engineering Record*, of New York, formerly the *Sanitary Engineer*, deserves great credit for its determined and persistent advocacy of all real improvements in plumbing, and of the proper systems of piping and ventilation. The care with which all matters are sifted before they appear in this journal is to be much commended. Great credit should be given also to the *American Architect*, of Boston, which has published many articles in this line, and held its columns open for discussion.

Other magazines have used little judgment in the selection of articles; they have been either exaggerated for the purpose of an alarm, have been fulsome puffs of inventions or systems, or show a great lack of knowledge on the subject they have allowed in their columns. This agitation has produced a revolution in plumbing practice during the last ten years. The first and principal gain has been the adoption by the principal cities of plumbing-regulations. Although these regulations are not all good, and the best of them are not free from defects, still the worst of them require plumbing which is far in advance in arrangement and execution over the ordinary work in vogue fifteen years ago.

Washington claims to be the first city to adopt plumbing-regulations. These have been improved, from time to time, and last fall they received an extensive revision. Washington now requires all master-plumbers, before they can practise their trade, to pass an examination. This I consider a great advance and worthy to be adopted by cities that have not at present put such laws into execution, as it certifies to a plumber having at least a limited knowledge of his trade, and a capacity to do his work. The requirement of city inspectors and the testing of pipe systems by water and air are excellent points attained.

A recent improvement in terra-cotta pipes has been increased thickness, depth of hub and ribs in hub and spigot. In all good work in recent years light cast-iron pipe has been discarded, heavy iron being used in its place. Several companies are now testing their cast-iron pipe by hydraulic pressure before sending it out. This is a decided gain, as cast-iron pipe of the best make was liable to sand-holes and other defects, many of which were covered by the pitch or other coatings. Instead of the old method of cutting holes in pipes of either terra-cotta or iron, fittings are now furnished suitable for every contingency that may arise in ordinary practice.

One of the best modern improvements for house sewerage is the introduction of wrought-iron and steel pipe with screw fittings, by Mr. C. W. Durham. This gives a rigid piping system in no way depending on floors, which may rupture the joints in ordinary systems by settlement or shrinkage, and at the same time gives an opportunity for absolutely tight joints in pipes and connection with fixtures.

Data as to the life of pipes and effect of coatings in ordinary use have been accumulating slowly. Lead pipe is practically indestructible; many pieces are still in perfect condition that were in use in Rome, Pompeii and other cities two thousand years ago. Iron, which has come into such extensive use during the last few years, is subject to destruction by oxidation. How rapidly and under what conditions this occurs is a matter of importance. Fresh water oxidizes wrought-iron more quickly than it does cast-iron, while salt water seems to have an opposite effect.

The rate of wear on wrought-iron supports where subjected to action of air and water alternately is apparently one inch in twenty years, as proved by supports on lighthouses. Cast-iron pipe fails from accretions on the inside when used for water-supply, peculiar nodules filling the interior of the pipe. This trouble has been encountered in all the cities where cast-iron pipe was first used. This seems to be particularly the case with soft waters. As for soil-pipe, the slime which adheres to the interior seems to protect both cast and wrought iron, and the necessity is to guard the pipe from destruction on the exterior. Where the pipe is subjected to a constant change of conditions, *i. e.*, action of air and water alternately, it deteriorates rapidly. Pipes taken from the streets of Alexandria, Virginia, laid in gravelly and made grounds, buried in 1851, and taken up in 1885, were practically worthless, being soft and easily pulled apart with the hand, while pieces buried in clay soil were perfect. The city-engineer in Philadelphia informs me that he has found the same to be a fact in Philadelphia, and others have noted the same effects.

It seems needless to say that paint will protect the exterior if put on before oxidation begins (red lead forming the best first coat), otherwise oxidation will go on beneath the surface of paint. Pitching or asphalting seems to act as a preservative, although there is very little positive data showing how long such coating will protect the pipe. Iron pipe may be obtained dipped in metallic paint; this answers but a short time. Galvanizing is but a trifle more effective. Enamelled iron pipe, if the enamel surface can be kept intact (not an easy task), would form an ideal pipe for interior protection; but as soon as oxidation begins, the enamel chips, and the whole surface is rapidly fluxed off.

The Bower-Barff, or rustless-iron process (where it is not necessary to cut through the surface, or where it is treated after the pipes have been cut and fitted) seems to have answered its purpose well for both wrought and cast iron during the short time it has been in use; but its effectiveness is weakened by the necessity for cutting and fitting pipes while work is in progress.

As to the effect of pipes on health: Lead-pipe has been traditionally injurious to health from the time of Vitruvius, two thousand years ago, to the present day. In spite of this tradition millions of people have been drinking water passed through it from that day to the present time, and it seems to be doubtful if one well authenticated case of lead-poisoning by the use of lead pipe has been found.

Lead tanks subjected to the action of air and water alternately are undoubtedly injurious, but the opinion of all experts who have recently examined the question quite thoroughly in France, England and Germany is, that lead-pipe is not to be feared except in unusual circumstances, to which it is never subjected in actual use.

Paris uses it in thirty-nine thousand five hundred houses, Berlin, in twenty thousand; yet no case of poisoning could be discovered by a commission appointed to examine into the question. The British Institute of Civil Engineers makes a similar report. Ten million people daily drinking water through leaden pipes would probably be a very low estimate of the fact, and still hardly a case in a year is even attributed to lead-poisoning by this means.

As for ventilation of the pipe system: The fresh-air inlet and the soil-pipe opening above the roof are, I think, now approved by all who have given the subject consideration. I am sorry to say that trap-ventilation, *i. e.*, a vent-pipe from the crown of the trap, is a matter still in dispute.

I have space simply to touch upon this subject in such a running review as I have been requested to make. Experiments have been made by Lissauer in Germany, S. S. Hellyer in London, Philbrick and Bowditch in Boston, the Master-Plumbers' Association of Worcester and Glenn Brown of Washington. The conclusion is drawn by each of the above experimenters that trap-ventilation is the best method of preventing siphonage and back-pressure. Mr. George E. Waring, Jr., of Newport, and Mr. J. P. Putnam, of Boston, deduce from their experiments that trap-ventilation is a fallacy. The five experimenters first mentioned draw their deductions from the fact that it is practically impossible to siphon or force by back-pressure a properly vented trap, while all unventilated non-mechanical traps are liable under one contingency or another to siphonage and back-pressure.

Although the conclusions of Messrs. Putnam and Waring are the same, they are drawn from diametrically opposite standpoints. Mr. Waring concludes that vents are useless because traps will never siphon in ordinary contingencies. From his experiments Mr. Waring must admit that traps are better when protected with vents. Mr. Putnam concludes that vents are useless because vented traps under ordinary circumstances are never safe against siphonage. Messrs. Putnam and Rice, who conducted their experiments jointly, are the only experimenters of the seven who conclude that trap-ventilation is useless because of non-protection.

Dr. Lissauer, S. S. Hellyer, E. S. Philbrick and E. W. Bowditch, and the experiments at the Museum of Hygiene show the necessity

and utility of trap-ventilation, both to protect the seal from back-pressure and from siphonage. All the contingencies that would be likely to occur in ordinary practice are covered by one or the other experimenters. Traps mechanical and non-mechanical of varying sizes being used, long and crooked vents of varying size and length being used by S. S. Hellyer and at the Museum of Hygiene. Small and large waste-pipes being used by S. S. Hellyer and E. S. Philbrick. The effect of siphonage by momentum being specially tested by E. S. Philbrick. The effect of discharges in stories above and below the traps being tested by all the experimenters.

From Mr. Waring's experiments I would draw the conclusion that ventilation is a necessity, although he draws the opposite conclusion therefrom. Traps unventilated were siphoned with soil-pipe open, while his vented traps in other positions were not siphoned even when the soil-pipe was closed.

The experiments of J. P. Putnam are the only ones which show failure by siphonage and back-pressure in almost every case with vented S-traps. Taking into consideration the results of the six other experimenters, the results shown in those of Mr. Putnam must be attributed to the unusual form of his apparatus, he having adopted unusual combinations. Mr. Putnam's experiments apparently show that the "Sanitas" and the larger "pot" traps resisted back-pressure. The reason for this was that his apparatus was arranged in the most favorable manner to prevent back-pressure, a straight soil-pipe with the minimum amount of friction and a fresh-air inlet open. Now in actual practice the soil-pipe often necessarily has offsets and bends and the fresh-air inlets in seventy-five per cent of actual cases (the small perforated covers) are closed or partially closed by dirt, when the maximum of back-pressure would be encountered, and when no trap in ordinary use would have sufficient water to counteract the pressure. Then, all the water in the trap is not necessarily driven in the pipe above the trap, but is forced back through it, usually in bubbles, the water passing up partially above the trap and falling back.

Even should Mr. Putnam's proposed method, *i. e.*, placing the trap at a sufficient distance below the fixture, prevent back-pressure, I do not see how it could in practice be applied to any fixture except wash-basins and sinks; we could not go sufficiently below the floor for bath-tubs. Mr. Putnam does not offer us a substitute for the S-trap in plain hopper-closets, slop-hoppers, etc., or object to the foul matter between the basin and trap. That trap-ventilation is necessary for large S-traps under hopper-closets, slop-hoppers, etc., I think even he would admit. The danger of sewer-air passing in bubbles by back-pressure has been questioned. Sewer-air is dangerous only in case disease-producing germs are in it and in this case bubbles passing through by back-pressure would be dangerous.

Prof. Raphael Pumpelly, in his experiments, covers this point of danger in bubbles passing through traps. I quote from the National Board of Health, *Bulletin* 13, the conclusion from the experiments given by Professor Pumpelly the following words: "At normal summer temperatures no germs were given off from the decomposing liquids whenever their surfaces remained unbroken, even though in some of the experiments the air was continuously conducted over them in a slow current. When the surfaces of the liquid were broken, however, by the bursting of bubbles, germs were invariably given off and sterilized infusions infected, no matter how slowly the aspiration was conducted."

Since the above experiments were made J. E. Denton made similar ones on ball-traps, tortuous-passage traps without vents, and on S-traps with vents, and with the McClellan vent: they prove only what has been already proved in previous experiments — that properly vented traps are better than others. The bulk of these experiments were with the McClellan inlet, showing it to be equal to a vent $13\frac{1}{2}'$ long of $1\frac{1}{2}''$ wrought-iron pipe with two elbows. In neither case does this protect against back-pressure. It proves that the 3″ vertical vent should run parallel with the soil-pipe, the only thing that will prevent the severest siphonage and back-pressure.

The deductions to be drawn from the above facts are:

1. That unventilated traps are liable to fail from either or both siphonage and back-pressure.
2. That small traps should have vents the size of the trap, and the main vertical vent should be 3″ in diameter in ordinary dwelling-houses, and should be computed for larger houses.
3. Ventilated traps do not fail by either back-pressure or siphonage.
4. That ventilation through pipes of the proper size should be required in all specifications.

There is one point which it seems proper to mention in connection with trap-vents, *i. e.*, the claim that they are stopped by accretions from the grease and other matters thrown into them by the water passing through the trap. I have made inquiries as to old traps taken out, and have never found vents stopped, with the exception of a few found in water-closet traps. Recently I had a vent opened in a $1\frac{1}{4}''$ S-trap under a sink in constant use by four or five families in a tenement, for kitchen and other slops, which, to my knowledge, had been in use constantly for between four and five years. The $1\frac{1}{4}''$ vent was attached directly at the crown of the trap by a wiped solder-joint in the common way, without being bell-shaped or enlarged. The use to which it had been subjected, the position and method of attaching the vent, made conditions the most favorable for stoppage. The vent was found entirely free from accretions; there was probably one-sixteenth of an inch of grease and slime on the sides of the trap and vent. The point of attachment and the vent were cleaner than the trap.

From this and other numerous inquiries I have made, I conclude that trap-vents are closed by such accretions only under peculiar conditions. Traps are now made to prevent such possible accretions. Trap-ventilation is important, not only on account of siphonage, but bceause the constant current of air passing through the trap hastens the division of decayed matter into its constituent gases.

The question of increased evaporation caused by trap-ventilation is one, I think, of little practical importance, as failure is never likely to occur from this cause except in unoccupied houses, and, in cases of this kind, either ventilated or unventilated traps should be specially looked after.

In the matter of methods of testing pipe-systems, the smoke and peppermint tests are of little service, as they do not represent any pressure. Filling the pipes with water or testing them with compressed air, the pressure showing on a gauge, are the only reliable methods.

Of apparent recent improvement in plumbing fixtures — I say "apparent" because many have not been in use long enough to give the guarantee which time alone can give, I will say only a few words. Several years ago, in the preparation of my work on water-closets, I stated that the only objection to the short-hopper closet was the small water-surface; but, even with this defect, I considered it the best form in the market. Quite recently, two manufacturers, Dalton & Ingersoll and J. L. Mott, have put upon the market a short-hopper closet with enlarged water-surface, which is a decided improvement. These forms, from their extreme simplicity, efficiency and cleanliness, still kept this class of closet in the lead. I consider the different forms of siphon-closet the next best. Quite an improvement has been made in the seats of closets by attaching the seat and lid to the bowl itself; in this way the seat is detached from the wall, and the space behind the closet is open to inspection. Cooper and Mott have introduced such seats.

The introduction of porcelain and earthenware sinks, laundry-tubs, slop-hoppers and other fixtures is a great addition to healthfulness. Such things are too costly for the ordinary householder.

The wood-fibre plumbing fixtures are neat and cleanly in appearance, light and easily handled. I have not yet had much experience in their durability.

The new copper-lined steel bath-tub is an improvement worthy of notice for houses of moderate cost.

The great gain in recent years from adopting open fixtures, tiling and doing away with woodwork in the bath-room is so well known, although of recent adoption, that it scarcely seems necessary to call attention to the fact.

PHILADELPHIA AND THE AMERICAN INSTITUTE OF ARCHITECTS.[1]

ORGANIZATION OF THE INSTITUTE.

Gateway to a Bohemian Farmhouse. From *Architektonische Rundschau.*

DECEMBER 6, 1836, is a memorable date in the annals of American architecture. On that day eleven architects met at the Astor House, New York, to form an "Association for the Advancement of Architectural Science in the United States." Of those pioneers in the organization of what has since become a great national body not one remains to us. The meeting was a representative one in the best and widest sense, and the names of the attendant architects have become household words, not only as the organizers of architectural unity, but for their professional attainments and personal character. Alexander J. Davis, architect of the University of the City of New York and of many of the more prominent buildings of that day, presided. Thomas U. Walter, of Philadelphia, architect of Girard College, and later the designer of the dome and extensions of the Capitol at Washington, the second

[1] Extracts from a paper by George C. Mason, Jr., published in the Philadelphia *Public Ledger*.

President of the reorganized Institute of Architects, and the first architect to receive, as such, the degree of LL.D. from Harvard University, was the secretary of the meeting, and issued the call which brought its members together on that day. Philadelphia also sent William Strickland, architect of the United States Custom-house, the Mint, the Exchange Building on Dock Street, and later of the Capitol of Tennessee, at Nashville. With them came John Haviland, another Philadelphia architect, an Englishman by birth, and a pupil of James Elmes, the blind architect, and author of a delightful work, the "*Life and Times of Sir Christopher Wren.*" Haviland had already made a high reputation for himself, and was the first architect to apply the radiating system to the construction of prisons, which he put in practice in his designs for the prisons at Pittsburgh and at Cherry Hill, in Philadelphia. John C. Trautwine, also of Philadelphia, architect and engineer, whose name in connection with scientific research and calculations is known all over the world, was unable to be present, but sent a letter endorsing the project. An organization was formed the following day, William Strickland presiding. This organization was formerly ratified under the title, "The American Institution of Architects," at a convention held in the old Pennsylvania Academy of Fine Arts, on Chestnut Street, Philadelphia, May 2, 1837, with a membership of twenty-three professional, two associate and twenty-five honorary members.

A comparison of dates of similar organizations with that of the Institution will be interesting. The Institute of British Architects was chartered January 11, 1837, and, by a supplemental charter, dated March 28th of the same year, had the word "Royal" prefixed to its title. There had been some informal meetings in London as far back as 1834, but 1837 is really the date of commencement of the Royal Institute of British Architects. The Architectural Association (London) was not founded until 1842, so that, among English-speaking peoples, the organization of the American Institution of Architects was well abreast of its foreign prototype.

Unfortunately, however, the Institution could not be made successful under its original plan. There could be but little cohesion in a body with a membership of only twenty-five architects, scattered all over the United States. There could be but little opportunity for meetings or mutual encouragement. The Institution practically slumbered for twenty years, and was then revived and chartered under the title of the American Institute of Architects. This reorganization was effected in the City of New York in the year 1857, with Richard Upjohn, of New York, the architect of Trinity Church and many other noted edifices, as its first President. The old Institution was never disbanded, its officers held over until their successors were appointed, and we may thus truthfully claim May 2, 1837, as the date, and the City of Philadelphia as the place of its nativity.

THE CHAPTER SYSTEM ADOPTED.

From 1857 until 1867 the Institute was simply a national body, with headquarters in New York City. In the latter year a second reorganization was effected and the chapter system inaugurated, with one Chapter — that of New York — and with national officers. The second Chapter was organized in Philadelphia, November 11, 1869. There are now 26 Chapters, scattered all over the country, with a total Institute membership of about 500, with numerous Honorary and Corresponding Members.

From the first inception of the Institution, 1836, Philadelphia architects were towers of strength to the profession, struggling to cement an organization of American architects into a society that should elevate the position of its individual members as skilful designers and well-instructed practitioners. Not only in their local Chapter, but in the broader councils of the Institute, their influence was exerted, and with the best results.

THE PHILADELPHIA CHAPTER.

The Philadelphia Chapter was organized and chartered under the laws of the Institute and of the State of Pennsylvania, November 11, 1869. It is a curious fact, that as the American Institute grew out of the old Institution of 1836, the Philadelphia Chapter was the legitimate heir of the Pennsylvania Institute of Architects, a body chartered March 4, 1861, as an entirely independent organization. The list of charter members of the Pennsylvania Institute included such well-known and honored names as John Notman, Napoleon Le Brun, John McArthur, Jr., Samuel Sloan, Edward T. Potter, James C. Sidney and Samuel D. Button, the last-named being at present the oldest practising architect in the United States. The constitution of the Pennsylvania Institute set forth an elaborate explanation of the *raison d'être* of the association: "To perfect the knowledge and elaborate the art of architecture and the sciences in connection with it. To elevate the standing of its professors by affording facilities for a free interchange of thought and a mutual agreement on the laws and rules necessary to be observed in its practice." Thus, before the Philadelphia Chapter was organized, the Pennsylvania Institute might have been said to be, in its limited field, a rival of the American Institute of Architects, the constitution of which sets forth that they are "to unite in fellowship the architects of this continent, and to combine their efforts so as to promote the artistic, scientific and practical efficiency of the profession."

The Pennsylvania Institute was short-lived, and exerted but little influence, partly from its want of scope as a parent body and partly through the troubled condition of the country, then in all the turmoil and excitement of the Civil War. Some of its strongest members left its councils and removed to other States, while others, seeing that two bodies could not well occupy the same field, urged that all influences should be exerted to strengthen the national body. Thus, in due time, out of the general reorganization of 1867, the Philadelphia Chapter came into existence. . . .

The founders of the Institution of Architects, the American Institute of Architects and the Philadelphia Chapter were strong men; they builded better than they knew, and it seems but tardy justice to gather together some recollections of those days of struggle for the encouragement of our younger students and as contribution to the history of the growth of the profession of architecture in the United States.

Among the names of the pioneers of national unity, none are more highly honored than those of Thomas U. Walter, LL.D., second President of the American Institute of Architects, and Henry A. Sims, Secretary for Foreign Correspondence. . . .

In the years immediately following the reorganization of the American Institute of Architects in 1867, Henry Augustus Sims, of Philadelphia, won high esteem in its service. He was elected to fellowship in 1869, and the next year was, as it were, at a single step, placed in the highly responsible position of Secretary of Foreign Correspondence. He at once gave evidence of his great talents and fitness for the position. At that time the Institute was young and feeble, recently organized, and almost unknown outside of the United States. At his death, in 1875, he left behind him a store of valuable documents gathered from all parts of Europe; had established affiliation with many foreign societies of influence, and made a record for usefulness, capability and industry that indicates how much time he must have withdrawn from his private interests for the benefit of his profession.

In the first year of Mr. Sims's official connection with the Institute he established communication with the following societies: The Institute of Portuguese Architects; the Architectural Institute of Scotland; the Royal Institute of Architects of Ireland; the Architects' Union of Berlin; the Architectural Union of Hamburg; the Austrian Engineers' and Architects' Union of Vienna; the Imperial Academy of St. Petersburg; the Archæological Society of Athens; the Architects' and Engineers' Union of Hanover; the Architects' and Engineers' Union of Breslau; the Central Society of Architects of Paris; the Society of Architects of the Department of the North at Lille.

In connection with the above, Mr. Sims had an extensive correspondence with individual architects and scientific men. He also formulated and distributed through Europe a concise history of the American Institute of Architects from the first organization in 1836.

The lines of communication thus opened, the advantages soon began to appear. Herr Bœkman, Vice-president of the Berlin Union, wrote that he would "gladly assist in weaving a band which should draw more closely the Berlin Union of Architects and the American Institute of Architects, and that he was sure that in saying this he was only giving expression to the Berlinese brethren in art." M. César Daly, author of the great *Revue générale d'Architecture*, wrote that he "was so favorably impressed with our system of organization, combining such perfect local liberty with such a powerful common tie, that he had warmly recommended its study to the Société Centrale des Architectes de Paris."

The next year Mr. Sims added to the list of foreign correspondents, viz: The Royal Academy of Denmark, at Copenhagen; the Society for the Propagation of Architecture in the Netherlands, at Amsterdam; the Academy of Fine Arts at Geneva.

Through these correspondents much valuable information, together with books, pamphlets, reports, etc., were received, all of which seem to have been carefully studied by Mr. Sims, and his reports were replete with quotations, comments and suggestions thereon.

In 1873, the seed thus sown began to bear fruits that were stimulating to American architecture. In a letter received that year from the Société Centrale des Architectes, there is an account of the formation of a committee "*to examine the analogy which may be made to exist between French societies of architects and our own Institute and Chapters.*" The report goes on to state that: "Previous to the year 1843, the year of the institution of our Société Centrale, there existed only the Société Academique de Lyon, but since that period societies of architects have been formed at Besançon, Troyes, Bordeaux, La Rochelle, Lille, Marseilles, Nantes, Rouen, Versailles and in other places. . . . Your committee, inspired by the forms regulating the American Institute of Architects in this matter, and which have since been followed by the Royal Institute of British Architects, has come to the conclusion that it would awaken a general interest and cement closer union among the architectural societies of France than that which now exists if we were all to unite annually in a national conference."

The above report is also valuable in that it sets forth the acceptance of the American policy by the R. I. B. A., whose charter dates from the same year as that of the A. I. A.

In 1874, although in private affliction, Mr. Sims added materially to the amount of foreign correspondence, and laid before the Convention of that year a scholarly and admirable report, drawing freely in quotation from communications received from societies in Germany, England, Russia, Sweden and Norway. He closed this,

his last report, with the following paragraph: "I think all will agree that one important function of the office I have held for several years is the procuring of such information from foreign lands. Much of such information may be so procured which can be turned to general advantage in our American architecture."

Among those pioneers in American architecture, for in those days they might truly be termed such, William Strickland should be especially remembered. I have already stated that he was the pupil of Benjamin H. Latrobe. He assisted that architect in connection with the Pennsylvania Bank. Besides the works with which his name is connected in the first part of this article, he designed the United States Naval Asylum, the United States Bank, old Masonic Hall on Chestnut Street, Chestnut Street Theatre, Arch Street Theatre, St. Stephen's Church and other works of importance. In 1825, he went to England to examine the canals and railway systems of that country, and, on his return, superintended the construction of the railroad between Newcastle and Frenchtown, Md. He was a member of the Royal Society of Civil Engineers and of the American Philosophical Society. Among his publications may be noted "*Triangulations of the Entrance into Delaware Bay*" (Philadelphia), "*Report on Canals and Railways*" (1826), and "*Public Works of the United States*" (London, 1841).

In 1844 Strickland was called to Nashville, Tenn., to design and supervise the construction of the State Capitol. This was his last work. He died April 7, 1854, and the Capitol Building was completed under the supervision of his son, F. W. Strickland. By an act of the Legislature of Tennessee, his remains were entombed in a vault sunk into the wall of the north porch of the Capitol, about four feet above the pavement. The covering slab bears the following inscription:

"William Strickland, Arch't,
Died April 7, 1854, aged 64 years.
By an Act of the Legislature of Tennessee,
His remains are deposited within this vault."

In the State Library of Tennessee is a very fine portrait of Strickland, by Cooper, and a well-modelled bust, in bronze, of the old architect is in the rooms of the Tennessee Historical Society. The bust was executed from life, by Nicholai Gevelot, in Paris.

In addition to the notice given of John Haviland as one of the originators of the Institution of 1836, it should be said that, before emigrating to the United States in 1816, he went the year previous to Russia with the intention of entering the Imperial Corps of Engineers. Among the buildings erected from his designs in this country may be enumerated the Hall of Justice, New York; United States Naval Asylum at Norfolk, Va.; the State Insane Asylum at Harrisburg, together with the State Penitentiaries of New Jersey, Missouri and Rhode Island. He was the author of "*Building Assistant*," 3 vols., 8vo, Baltimore.

The above notes on old Philadelphia architects and their services in connection with the organization of the American Institute of Architects have been drawn from authentic sources, and largely from the records of the A. I. A.

ILLUSTRATIONS

[*Contributors are requested to send with their drawings, plans and a full and adequate description of the buildings, including a statement of cost.*]

UNITARIAN CHURCH, BELMONT, MASS. MESSRS. HARTWELL & RICHARDSON, ARCHITECTS, BOSTON, MASS.

[Gelatine Print, issued with the International and Imperial Editions only.]

SKETCHES MADE IN THE LATERAN MUSEUM, ROME, ITALY, BY MR. W. M. MACCAFFERTY, BROOKLYN, N. Y., *American Architect* TRAVELLING-SCHOLAR FOR 1892.

[Issued with the International and Imperial Editions only.]

DOOR OF THE PALAZZO VECCHIO, FLORENCE, ITALY. MEASURED AND DRAWN BY MR. W. M. MACCAFFERTY, BROOKLYN, N. Y., *American Architect* TRAVELLING-SCHOLAR FOR 1892.

[Issued with the International and Imperial Editions only.]

DOOR OF SAN AGOSTINO, ROME, ITALY. MEASURED AND DRAWN BY MR. W. T. PARTRIDGE, LATE ROTCH TRAVELLING-SCHOLAR.

[Issued with the International and Imperial Editions only.]

ST. ANDREW'S PRESBYTERIAN CHURCH, ST. JOHN'S, NEWFOUNDLAND. MR. J. M. MACQUEEN, ARCHITECT, HARRISBURG, PA.

THIS church is to be erected in place of the one burned down in July 1892, in the conflagration which destroyed one-half of the city. The site is a magnificent one overlooking the city, and is also large enough for the Presbyterian Academy and the Manse to be erected on, at some future date. It will be probably built of a dark blue trap rock from "south-side" quarries, with imported (cut) trimmings. The seating, of oak, is circularly arranged and will accommodate 950 persons. The roof will be an open-timber one of pitch-pine, with the bays arranged in panels, plastered and painted in distemper; the ceiling of the Lantern will be vaulted with wood ribs and plaster panels. The organ will occupy the centre at rear of chancel, the minister's and elders' seats immediately in front of organ-screen, the choir seats on each side of chancel, the pulpit on the longitudinal axis of the church just clear of the chancel-arch, with the communion-table directly in front of it. The pulpit, communion-table and chancel-screen will be of Alona Vale (West Va. Caen) stone. The probable cost will be $75,000.

MEMORIAL ORGAN FOR GRACE EPISCOPAL CHURCH, SAN FRANCISCO, CAL. MR. HENRY VAUGHAN, ARCHITECT, BOSTON, MASS.

THE new memorial organ being constructed for Grace Episcopal Church, San Francisco, Cal., will be placed in the north chancel aisle, one front facing the transept and the other the chancel. It will occupy a floor-space of 17 by 28 feet with key-desk and choir gallery in the transept. The organ-chamber has a height of 35 feet which, with the fine acoustic properties of the building, will greatly enhance the tonal effects of the instrument. The case is of quartered oak exceedingly rich in detail, with displayed pipes of burnished (proof) tin. The scheme of the organ, based upon a 32 foot tone,[1] comprises fifty-eight registers, with operating mechanism of the tubular[2] and other pneumatic systems. The tonal or artistic treatment which gives to the organ its character, will receive the highest consideration. The builders are James E. Treat & Co., of Methuen, Mass.

SKETCH FOR PROPOSED TAYLOR AVE. M. E. CHURCH, ST. LOUIS, MO. MR. A. BLAIR RIDINGTON, ST. LOUIS, MO.

THIS church was to be built with buff brick with darker brick in the pattern-work; stonework of blue Indiana stone; main roof covered with greenish-blue slate, while red tile would have been used for the tower-roof.

SEMI-DETACHED HOUSES, CHAMBERLAIN PARK, MO. MR. W. B. ITTNER, ARCHITECT, ST. LOUIS, MO.

HOUSE FOR MRS. J. W. BURROW, NORFOLK, VA. MR. J. A. WILSON, ARCHITECT, BALTIMORE, MD.

"THE PINES:" HOUSE FOR T. C. WORDIN, ESQ., BRIDGEPORT, CONN. MR. J. W. NORTHROP, ARCHITECT, BRIDGEPORT, CONN.

[Additional Illustrations in the International Edition.]

UNITARIAN CHURCH, BELMONT, MASS. MESSRS. HARTWELL & RICHARDSON, ARCHITECTS, BOSTON, MASS.

[Heliochrome.]

HEWELL GRANGE, BROMSGROVE, ENG.: THE GRAND STAIRCASE. MESSRS. BODLEY & GARNER, ARCHITECTS.

VILLA RESIDENCES, SURBITON, ENG. MR. R. LANO PEARCE, M. S. A., ARCHITECT.

THESE villas have just been erected on one side of St. Andrew's Square, within five minutes' walk of the river, rail and the main business thoroughfare, and have the additional advantage of having a well-kept and timbered garden square, with tennis-courts, croquet lawns, etc., opposite.

The work has been well and substantially executed, and although the kitchens are on the ground-floor, the nature of the site necessitated a basement, which has been built with hollow walls, and utilized for large, dry and well-ventilated cellars. The fronts are of red bricks, natural color, rough-cast and tile-hanging, the roofs also being tiled. Clear leaded pattern glazing has been introduced in all lights above transoms, and the hall-windows and front doors, the latter, a specially artistic feature, are glazed with leaded lights of special pattern, and have the glass starred-obscure and white; in fact, color has been studiously avoided in all glazing. Each villa contains five bedrooms, one dressing-room, box, linen and cistern cupboards, bath-room and lavatory (hot and cold) two water-closets, two reception-rooms, kitchen and offices, and three cellars. The decorations and tiles, etc., for the interiors, though simple, have all

[1] The CCCC or 32 foot tone is the lowest practical pitch used in organ building and requires a pipe of this length to give the open tone. Its effect is one which is rather felt than heard, and it imparts a grandeur and dignity to the instrument which cannot be imitated. The expense of this stop approximates $500.

[2] The terms pneumatic and tubular pneumatic refer to the use of compressed air operating upon small bellows and conducted through tubes to any desired locality, by which the labor of manipulation is reduced to a minimum.

been selected with the view to an artistic and harmonious *ensemble*, a feature generally woefully ignored by builders of the speculating rank.

DESIGN FOR LOCAL BOARD OFFICES, ILFORD, ENG. W. C. BRANGWYN, ARCHITECT.

NUREMBERG, AFTER A DRAWING BY SAMUEL PROUT.

COMMUNICATIONS

[*The editors cannot pay attention to demands of correspondents who forget to give their names and addresses as guaranty of good faith; nor do they hold themselves responsible for opinions expressed by their correspondents.*]

A QUESTION OF COMMISSION.

August 4, 1893.

To the Editors of the American Architect:—

Dear Sirs,—Our City Council instructed the Fire Commissioners to procure plans for an $8,000 central fire-station. We were commissioned to make plans and were given general lines of the building to follow, furnished them by their Chief of Fire-department. We told them at the time that it would cost more than they had set aside for the work, and also that we would make drawings and an estimate as they had directed. Our estimate was $13,000 and was rejected by the Council. We suggested several changes which could be made, requiring a complete new set of drawings, which was done and advertised for letting. Our actual estimate was $12,000 and the lowest bid received was $11,777. The Council rejected these plans and bids and again instructed the Commissioners to procure plans, cost of which should not exceed their price, $8,000. We were again instructed to make plans and then asked for instructions. The Commissioners declined to instruct us and called attention to what the Council had instructed them.

We again made plans, according to our own ideas which was held approved by the Fire Commissioners and Chief, and the lowest bid received on this plan was $7,775. These bids were also set aside and the Council approved the contract on the $11,777 building, thinking it was the better building for them to build, which building is completed, and we have been paid the 5% commission on the work. Now we ask a commission or reasonable compensation on plans for the cheaper priced building as the cost came within the instructions. Are we legally or equitably entitled to such commission? An early reply will oblige, Yours truly, Enquirer.

[We should say that, having faithfully followed the instructions given you were entitled to proper compensation for the extra work which you did in conformity with the Commissioners' directions, although they decided, in the end, not to make use of it.—Eds. American Architect.]

IS A PORCH A BUILDING?

Williamsport, Pa., July 24, 1893.

To the Editors of the American Architect:—

Dear Sirs,—Some time since we furnished plans for a house to be built on West Fourth Street, this city. The contract was let and the house staked off. The owner of the adjoining property gave notice that he would serve an injunction unless the house was moved back nine feet farther; in other words he set up the claim that the porch posts was the line. His deed reads that no *buildings* shall extend beyond a certain line. The question now is, is a porch a *building?* and must the extreme edges of the porch be taken as the building-line. An early reply will greatly oblige, Yours truly, R.

[Everything depends on the wording of the deed. It has been decided in a somewhat similar case, where the deed required "the main front wall" to be set twelve feet back from the street-line, that a one-st'y bay could not be built beyond the twelve-foot line, but that an open porch might be (Kirpatrick *vs.* Peshine, 9 C. E. Gr. 206). In the present case, however, the deed appears to restrict "building" generally, and it seems to us that a porch would be considered a part of the "building" to which it was attached.—Eds. American Architect.]

NOTES & CLIPPINGS

Does the Fair owe Most to Americans or Foreigners?—Another Briton, telling his countrymen about the Chicago Fair, acknowledges that its artistic success is greater than that of any of its predecessors, and probably will not be equalled elsewhere in our time. But, he explains, the fact of this success should not excite as much surprise as it commonly does. We Americans, he says, have the great advantage of being able to draw freely for artistic aid upon England, France and Germany, while each of these countries is forced—or, at least, accustomed—to depend upon itself. And we have been wise enough to use this opportunity freely, calling in foreign "artists and artisans" to help us with our Fair. No statement could be more misleading than this. Truly, we have profited by the thews and sinews of a multitude of foreign artisans, and a good deal also by their skilful executive fingers. Probably the Fair could never have been built had we been forced to depend upon American hands to build it, as well as upon American brains to design it. It is true, furthermore, that some of the sculptured decorations of the buildings are, in design as in execution, the work of foreigners. For instance, Mr. Bitter, who decorated the Administration Building, is an Austrian, but his work is certainly not among the great triumphs of the Fair, while that of most of his German-speaking associates, shown on certain other buildings, varies from dull and commonplace to crude and bad. The best strictly architectural decorations are Mr. Martiny's on the Agricultural Building; but, although he, too, is of foreign birth, he has learned much more about his art here than he did before he came, and one can hardly look at his charming groups and figures without remembering that he has long labored under Mr. St. Gaudens's influence. Moreover, the independent works of sculpture are almost all of purely American origin—almost all, and all of the really fine ones. The most conspicuous of them we owe to Mr. French, Mr. Potter, Mr. McMonnies and Mr. Kemeys. Every prominent bit of painted decoration within and without the buildings is likewise due to American hands. All the architects of the chief buildings are Americans—Hunt, McKim, Atwood, Van Brunt, Cobb, Post, Peabody and Stearns. And who needs to be told that the three organizers of the artistic aspect of the Fair—its three creators in the widest sense—were Americans, Olmsted, Burnham and Root? Subtract the part of American artists from the Fair, and not even the ghost of a Fair would be left. Subtract the part of foreigners, and we should hardly know that anything had been taken away; or, if we realized that some items had been, we should hardly regret any of them except Mr. Martiny's contributions.—*M. G. Van Rensselaer in the New York World.*

Vagaries of Custom-house Rulings.—The recent encounter of Mr. George A. Hearn, of New York, with the Customs authorities is significant. Mr. Hearn is well known throughout the country as a collector of paintings and other works of art. He is one of the powerful group of New York merchants who have played so conspicuous a part in American collectorship. He purchased, by order, in Europe, through Mr. Charles Sedelmeyer and Messrs. Boussod, Valadon & Co., three old masters—an Isaac van Ostade, a Jan van Goyen, and a Pieter de Hooghe. When these pictures reached the New York Custom House they were denied free entry, in direct violation of the Treasury rule, for they were incontestibly painted previous to the year 1700 and, with equal certainty, part of a collection. Yet they were ruled out by the sapient official in authority on the ground, first, that three pictures did not constitute a collection, and second, that they were too large for cabinet pictures. There is no clause in the Act upon which this official and officious person based his arbitrary detention of the paintings which relates to cabinet pictures. Any one competent to fill this incompetent's place knows, in the first place, that the term of the act "Cabinets of old coins and medals and other collections of antiquities" applies strictly, in the parlance of collectorship, to numismatical and other antiquities which come under the general head of case or cabinet pieces, that is, objects which are generally preserved in cases and cabinets. The term "cabinet pictures" is applied to small works, but it is an invented term, and in fact, any picture which can be got within the space of the wall of a room is a cabinet picture. The only use of the term in common sense is to distinguish between paintings which a man can keep in his house and the vast and grandiose canvases which require a large gallery for their display. In Mr. Hearn's case, a vigorous and sensible protest to the Secretary of the Treasury secured the release of the pictures. For this every collector in America should thank him. But what can be said of a condition of officialism which puts the power to detain such works in the hands of the Naval Officer of the port? It would be just as sensible to constitute the watchman at the Seizure Room, or the janitor at the General Appraisers' Stores, a censor superior to the Collector of the Port. Indeed, it is not impossible that these subordinates have really more acquaintance with objects of art than this Captain Jenks, of the Wall street movement, to the most grimly humorous tariff under the sun.—*The Collector.*

New Process of Seasoning Canadian Lumber.—Messrs. McRae & Co., of Ottawa are developing a new industry in Canadian lumber. They have secured the control of a German patent for the treatment of beech and birch woods. Mr. McRae, speaking on the matter, said: "The great objection, hitherto held against these woods is the fact that they are very difficult to season, and even when they have been seasoned fully forty per cent is defective. By the new process the sap is sweated out of the boards by being placed, in a green state, in steam chambers for twelve days, after which it is put into the drying-chamber for two or three days, according to thickness, and then by a chemical application the wood is stained throughout a rich walnut color. The process has been tried on a large scale in Germany for the past eighteen months, and has proved such a success that experts acknowledge that wood so treated is superior to walnut and the owners there write that they are quite unable to supply the demand. No country in the world has such forests of beech and birch as Canada and the discovery of this process will no doubt greatly enhance their value. A trial kiln has been built in Ottawa and the first parcel turned out last week is so satisfactory that works for the treatment of twenty-five car-loads monthly will be erected there immediately and arrangements made for the erection of two other plants, one in Western Canada and the other in the Province of Quebec. It is probable that the bulk of the first season's output will be shipped to England, where the wood is well known and can be readily sold on a profitable basis."—*Toronto Star.*

Old Spruce valuable for Violins.—The ancient Hammond House in Marblehead, Mass., is being torn down, and some of its spruce timbers, which have been protected from rain and wind for more than 200 years, are being eagerly sought after by violin-makers for use in the manufacture of their instruments.—*New York Times.*

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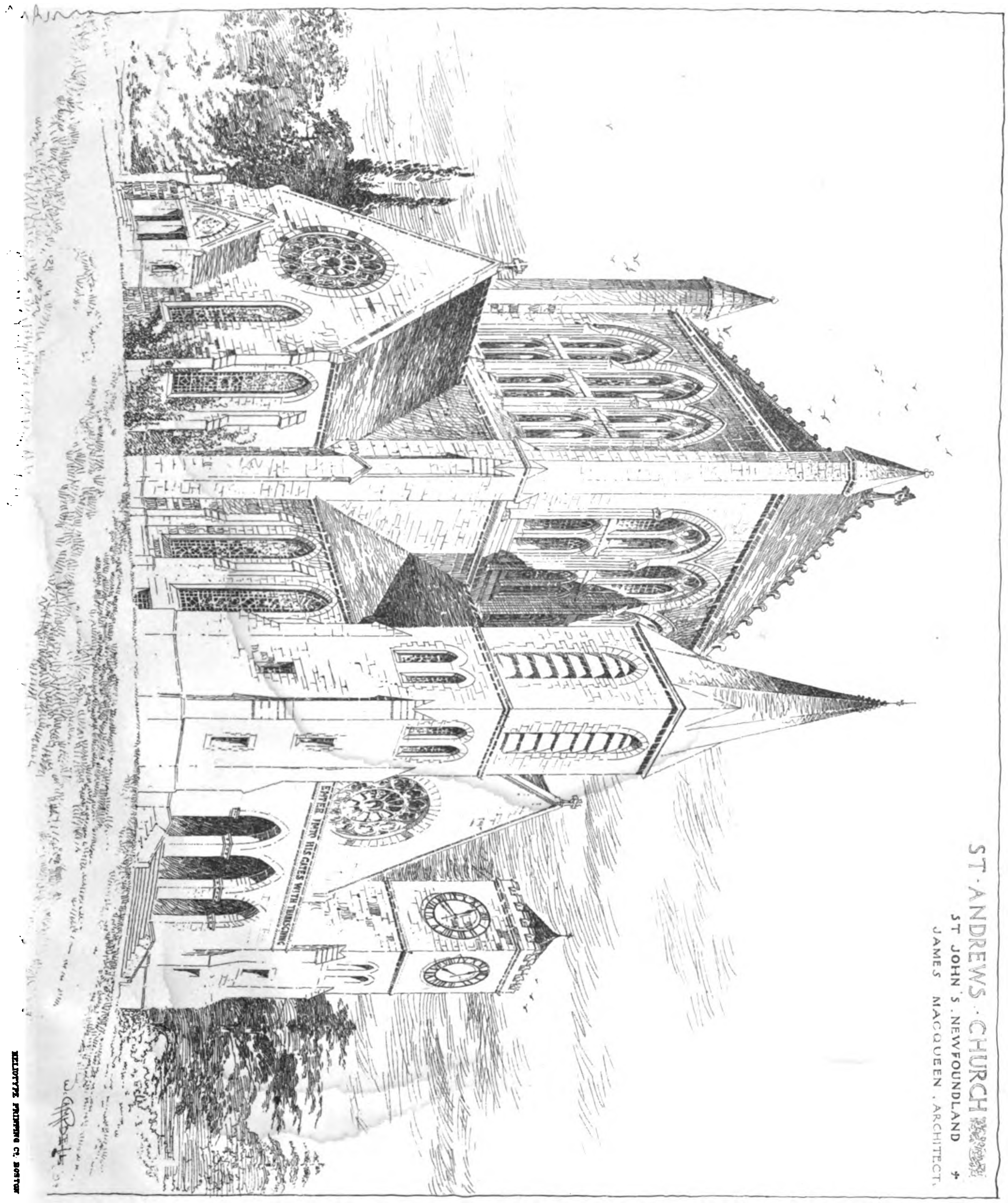

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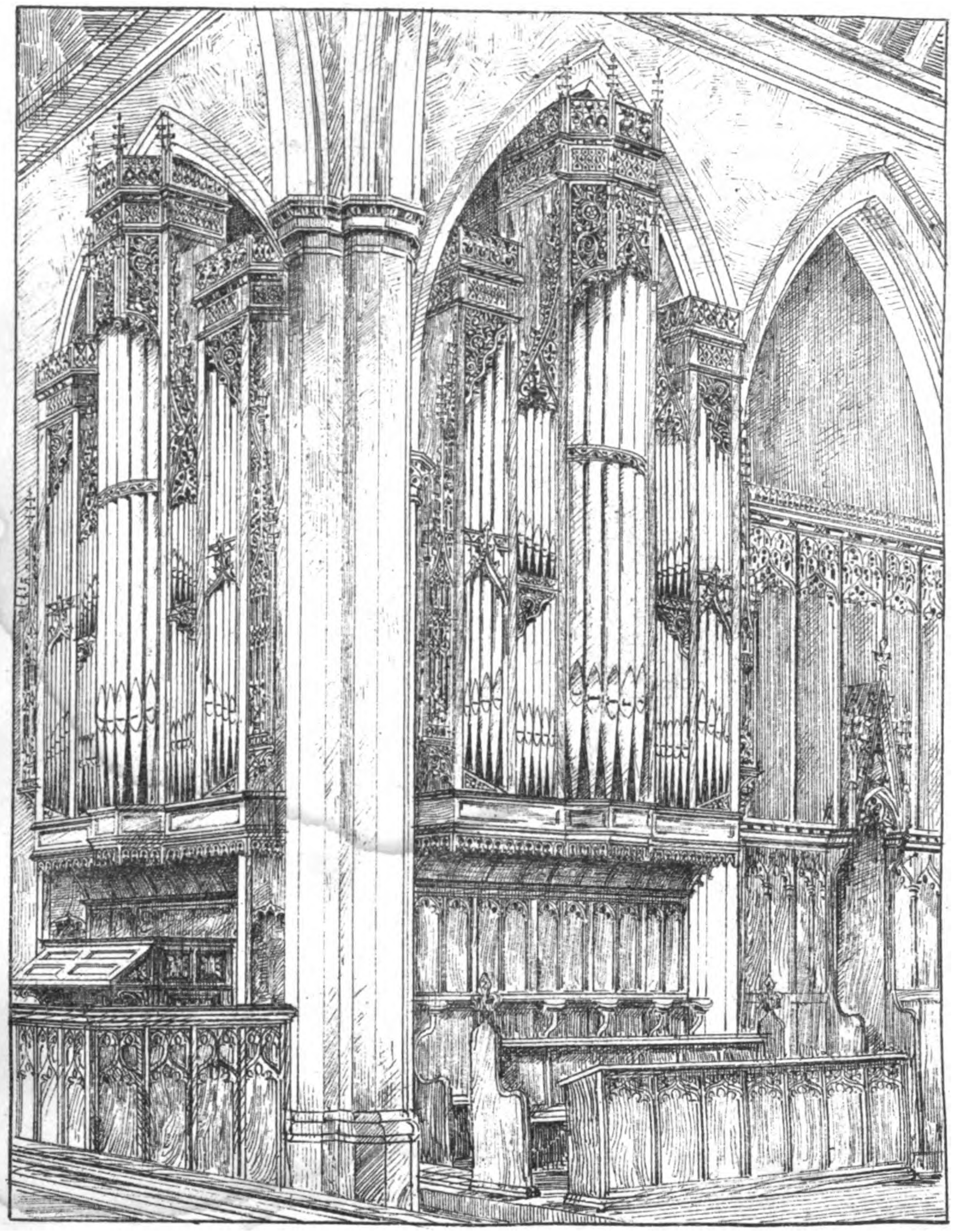

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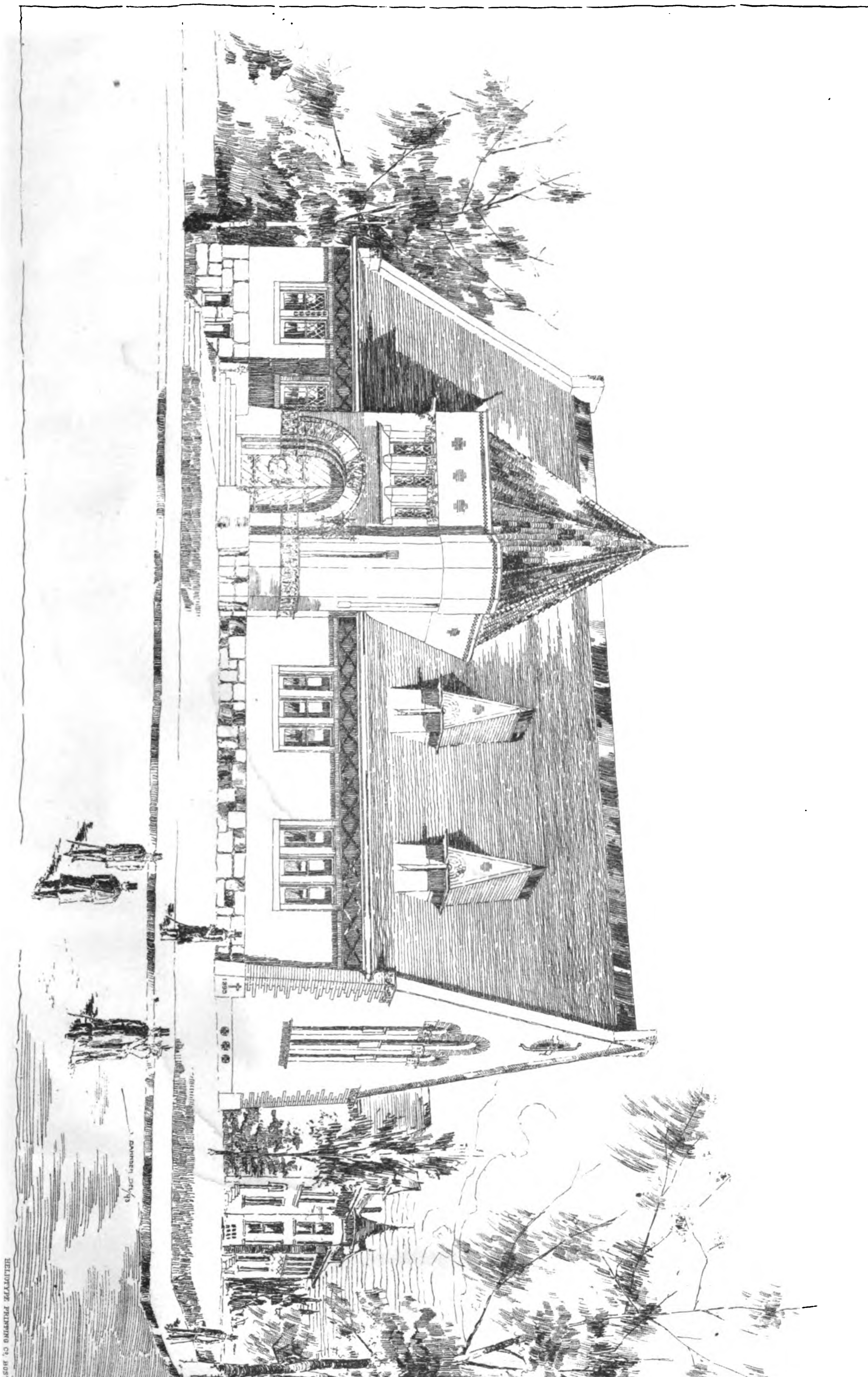

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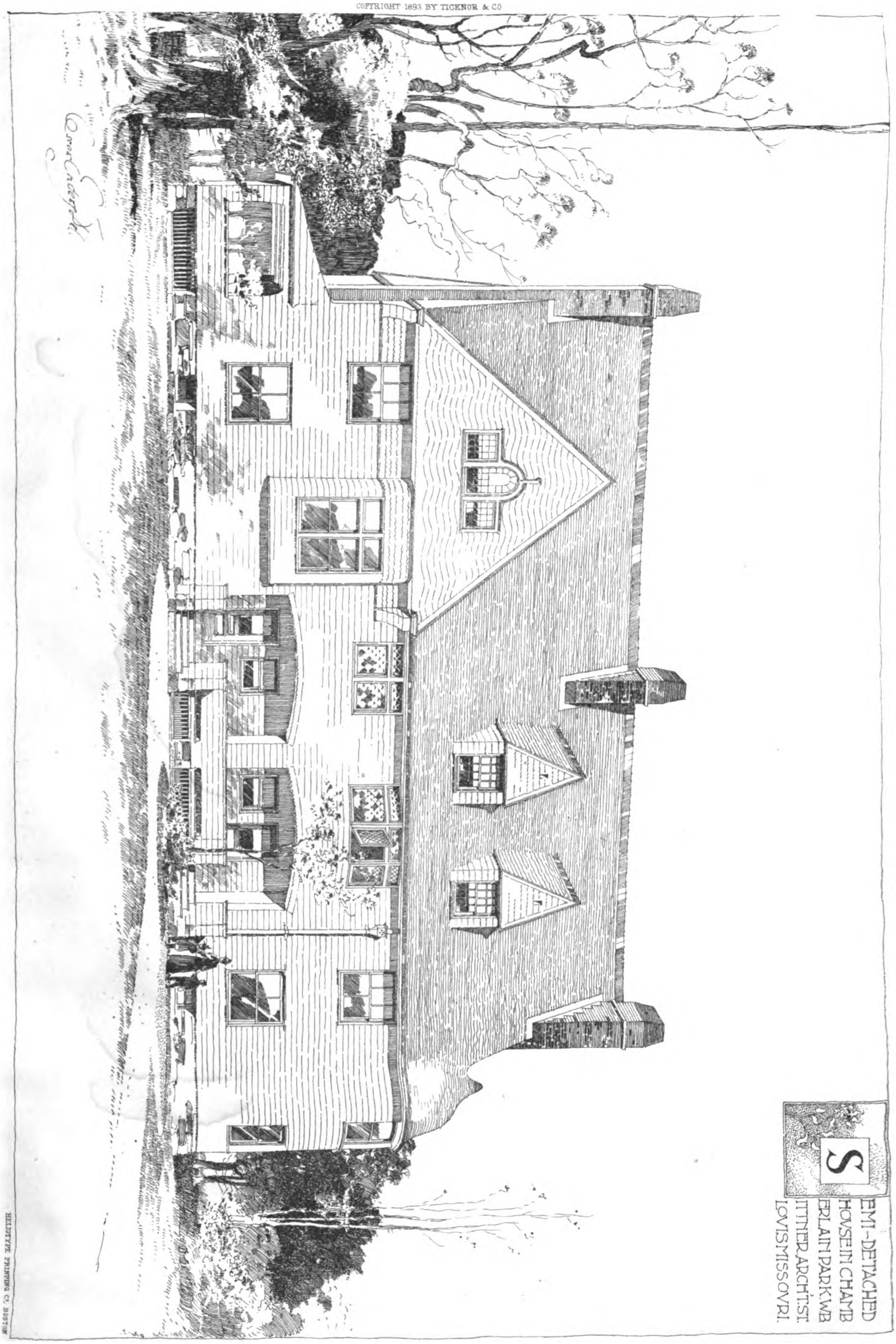
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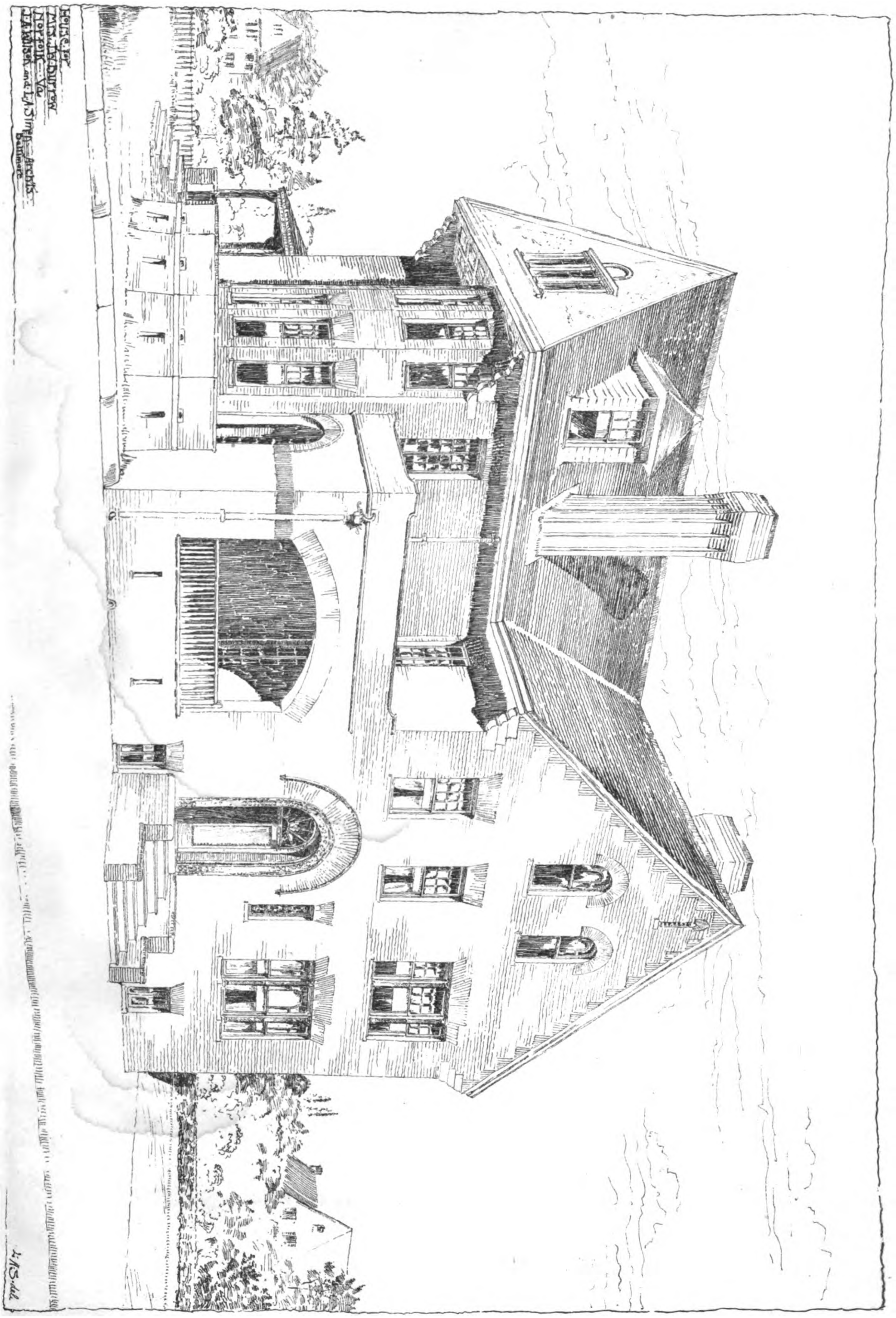
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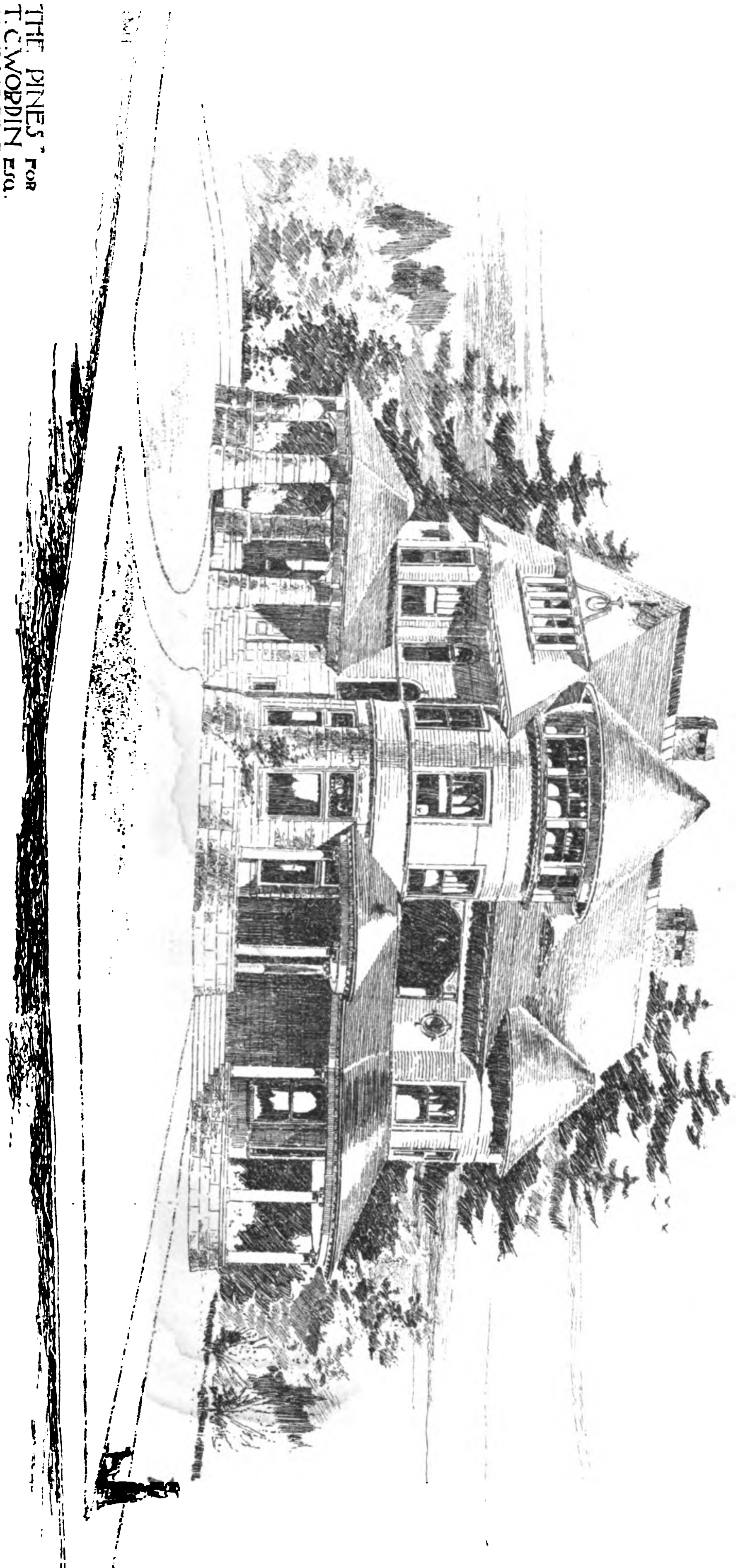

# The American Architect and Building News.

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AUGUST 26, 1893.

CONTENTS

THE Sculpture Society, of New York, is to hold an exhibition in December and January next, of works in those branches of art in which form is a factor, such as die-sinking, wood-carving, ivory-carving, glass-blowing, metal working in gold, silver, copper, brass and iron, modelling in terra-cotta and ceramics, cabinet-making, and so on, besides sculpture proper. All works are eligible which have not been shown at a public exhibition in New York since 1883. Selection will be made by a jury of acceptance. Further particulars, including the names of the members of the jury, and the exact date and place of the exhibition, will be made public later. It is, however, desired that intending exhibitors should inform the secretary as soon as possible of the nature of the works they propose to submit, with the exact dimensions, in order to facilitate the work of arrangement. Transportation to and from the place of exhibition must be at the expense of the artist, but the cost of handling in the gallery will be borne by the Sculpture Society. All desired information may be obtained from the Secretary of the Sculpture Society, Mr. F. Wellington Ruckstuhl, 37 West Twenty-second Street, New York.

A VERY curious lawsuit is in progress in Boston in relation to the scheme which was so much discussed last winter, of erecting a building for the Architectural Club. It will be remembered that the affair was a private matter of two officers of the Club, who took all the responsibility of the building, but made a very generous offer to the Club of rooms in it, with a share in the income to be derived from it. It seems that the officers, Messrs. Blackall and Norris, contracted with the Old South Church Society, the owners of a large lot of land near the Post-office, for a seventy-five-year lease of the land, on which they proposed to erect their building, to which they intended to give the name of the Club. The Trustees of the Old South Society agreed to give the lease if Messrs. Blackall and Norris would furnish security for carrying out their part of the agreement. The latter, as they claim, obtained from Messrs. Norcross Brothers, the well-known builders, a promise to furnish the security required, on condition that the contract for the erection of the building should be given to them. The church trustees required from the lessees a deposit of ten thousand dollars in cash, and a subsequent deposit of one hundred and fifty thousand dollars, in good collaterals, as security for the fulfilment of the stipulations of the lease, and these deposits, as Messrs. Blackall and Norris allege in their complaint, the Norcross Brothers agreed to make. The first deposit, of ten thousand dollars, was, it seems, duly made, but the Norcross Brothers failed to make the subsequent deposit of a hundred and fifty thousand within the time specified in the agreement, which, consequently, lapsed, and the whole project failed. By the rupture of the negotiations, Messrs. Blackall and Norris were deprived of the advantages and profits to be derived from the lease. They therefore bring suit against the Norcross Brothers for damages in the sum of two hundred thousand dollars, this being the loss which they consider that they have suffered from the defendants' breach of contract. The Norcross Brothers, on their side, claim that they have never placed themselves in such relations to the plaintiffs or to the lease as to make them liable for damages from the failure of the negotiations. The suit has been entered in the Suffolk Superior Court, and is likely, if it ever comes to trial, to excite much interest in the Boston building community.

ALMOST every one has heard of the Birkbeck Building Society, a corporation formed about forty years ago to advance money to members for building themselves houses, very much as is done by our coöperative banks. As time went on, the business of the Society, very naturally, took, in part, the character of that of a banking-house, deposits being received subject to call, and interest being paid on them, without necessary reference to their being invested in mortgages on houses belonging to members. Although the theory of the coöperative banks is that such mortgages form the safest and best investment for the depositors' funds, the Birkbeck managers seem to have foreseen what the recent experience of our Western mortgage-investment companies has shown — that mortgage security, which cannot readily be turned into cash to meet an emergency, should not be the sole dependence of an institution liable to sudden demands for money, and their management, as shown in the annual report, ought to be valuable to those who have anything to do with the direction of such institutions. During the past year, the receipts of the Society were £12,169,030, of which £9,857,817 were deposits. The surplus is £5,727,331. This is sufficient to pay all the deposits, with half a million pounds to spare, and is all invested in consols or other readily salable stocks and bonds, the advances on mortgage, under the original plan of the Society, being made out of funds not subject to call. The wisdom of this policy is well shown by the events of last September. At that time, as will be well remembered, the great "Liberator" Banking and Building Company collapsed, followed by several similar and allied companies. This brought a run on the Birkbeck Society. For eleven days the office was besieged by a crowd of members and depositors anxious to withdraw their money. Instead of requiring thirty or sixty days' notice of withdrawal, or paying in checks on some other bank, or trying to impede business by counting out money slowly and in small coins, as is done here by savings-banks in perfectly solvent condition, the Birkbeck officials did everything in their power to accommodate the crowd, keeping the office open extra hours and paying every claim on demand. In the eleven days, £1,578,005, or nearly eight million dollars, were paid out in cash over the counter. To raise this enormous sum, a portion of the consols owned by the Society was sold. As eight million dollars' worth, even of consols, could hardly have found a market all at once, the Bank of England advanced half a million pounds for a few days, until the consols should be disposed of. The directors had something like twice as much more money invested in salable stocks, so that they could easily have paid every depositor in full if the run had been continued, and, as the consciousness of this gradually penetrated the minds of the crowd, the panic abated, and money began to flow in faster than it had been withdrawn. In a short time the Bank of England advance was repaid, the consols sold were repurchased, and deposits had accumulated so rapidly that the directors, to check the flow, as well as to strengthen the Society's position, reduced the rate of interest paid on deposits to two and one-half per cent. Bankers here will wonder how an English company could pay more than two and one-half per cent on deposits and keep its investments within the limits of perfect safety, but, with deposits of twenty-five million dollars, a very small margin of profit in interest would amount in a year to a considerable sum.

THE *Bautechnische Zeitschrift* says that in Norway a sort of train-oil, made from haddock, is much used for mixing paint, in place of linseed oil, and is considered to be much more durable, as well as cheaper. What is called "brown train-oil," which is sold at about three cents a quart, is used, and is mixed with a little Japan dryer. It gives a smooth, shining surface, which resists the weather for a long time, and covers well, a quart of paint mixed with it, and used for a second coat, covering nearly one hundred yards of woodwork. Mixed with one part of dryer to forty of oil, the paint dries rather slowly, a second coat requiring a week to become hard enough to paint over. It seems probable that the haddock oil resembles in quality the fish-oil, made from menhaden, which is used in immense quantities in this country to adulterate linseed oil. Many painters say that paint made with pure menhaden oil is better for use on tin roofs, and certain other purposes, than linseed oil paint, for the reason that it is softer, and less likely to crack by the expansion of the work on which it is laid. Whether it would resemble the haddock-oil paint in durability we do not know, but as a great saving in the cost of painting small houses might be made by its use, it would be well worth while to have some experiments made to determine its resistance to the weather under varying circumstances. The experiments might be made with very little trouble and expense, and we would suggest that some student of architecture or engineering might prepare a very useful and interesting thesis on the subject.

WE wonder how many of our readers ever heard of a Roman-Irish bath. That such things exist is indicated by the fact that they are mentioned in the *Deutsche Bauzeitung*, and the description of them there given forms a part of an account of a great workmen's bath-house, which is interesting enough to condense here. It seems that the firm of Meister, Lucius & Brüning manufacture colors and dyes, in the town of Höchst, on the River Main. It is important to the health of workmen employed in handling such products that they should be able to wash themselves thoroughly and often, and, for this purpose, the firm has provided several bath-houses in various parts of the establishment. Quite recently, however, a very large central bath has been erected, which has several novel features. The building is nearly circular in plan, and two stories high, with a large central ventilating-shaft of brick, which passes through the middle of an iron reservoir placed on the roof, and assists in supporting its weight. Around the central shaft, in the lower story, are arranged eight sector-shaped rooms, each having eight small sinks for washing, while in the apex of the sector is a shower-bath; and around the exterior walls are fourteen more rooms, each provided with five bath-tubs and one shower-bath. The bath-rooms around the walls are repeated in the second story, but the middle portion of the second floor is open to give light to the interior bath-rooms below, by means of skylights in the flat roof. There is thus accommodation for bathing more than two hundred workmen at once. It would have been much cheaper, and less troublesome, to make all the baths shower-baths, as is done in the public establishments in the German cities, but the workmen require, for removing the dyestuffs from their skin, facilities for thorough soaking and scrubbing, such as are afforded only by tubs and sinks, the shower-baths serving mainly for a final refreshing rinsing after the more detailed cleaning is over. Besides the workmen's bath, separate rooms, all with tubs and showers, are provided for the overseers and clerks, and, in addition to these is the Roman-Irish bath, which consists of four rooms, one, heated to about 80°, and containing a tub, another, heated to 120°, and a third, opening out of the second, and heated to 150°. The fourth room is provided with three compartments, in which are marble slabs, on which the bather can undergo massage treatment if he wishes. It will be observed that this description agrees perfectly with that of the bath known here as "Russian," or "Turkish." The explanation seems to be that the South Germans, who live a good deal nearer to the Turks and Russians than we do, being unable to connect them in their minds with any sort of bath, have, like us, endowed their little tepidarium with a name derived from that of the nations to whom their imaginations attributed superior cleanliness. Whether they or we have made the more judicious selection of a name, we will not undertake to say. As to the Russian-Roman-Turkish-Irish bath at Höchst, it is sufficient to say that it is open to all employés of the establishment, but the ordinary workman must show a physician's order before using it, and must wash himself in the regular bath before entering the tepidarium.

THE method of warming the water for the baths shows the skilful economy of the Germans to great advantage. A large amount of clean water is used in the color works, for cooling liquids in jacket kettles. As it simply circulates around the kettles, it flows away as clean as it entered the works, but warm from the heat which it has absorbed. It is, therefore, in excellent condition to be taken to the bath-house, where it is received in the lower story. It must be lifted to the reservoir on the roof, and, for this purpose, it passes through an inspirator, fed with live steam from the factory boilers, which warms it at the same time that it pumps it into the tank. The water so heated would often be too warm for use, so a direct cold supply is provided for each bath. The waste water is allowed to flow into a brook, which empties into the river close by. The heating of the building is effected by low-pressure steam, live steam from the factory boilers being drawn through a pressure-regulator, and allowed to circulate through coils of pipe. This arrangement will strike our heating-engineers as curious. It is generally supposed that steam is proportionally more effective for heating at a high pressure than at a low one and the reduction of the pressure by the regulator absorbs a considerable amount of heat. Moreover, if the pressure of steam in the radiators is materially less than that in the boiler, it is difficult to return the condensed water to the boiler, so that there must, it would seem, be a further loss by discharging water and steam, at the end of the circulation, into the open air. However, German engineers do not lay out a steam plant at random, and there must be some good reason for adopting this system, which it would be interesting to learn.

THE *Builder* has a very well-written and clever editorial description of the Nicaragua Canal, of which it speaks with great favor. As it never had much enthusiasm about the Panama scheme, its approval of the present plan is a compliment to the engineers who have worked it out so carefully, and it speaks with commendation of the work which has been already accomplished, as compared with the wasteful inefficiency of the operations at Panama, saying that "the present proprietors of the enterprise have shown such a dogged determination to carry it out during the last fourteen years, that it is no idle dream to believe that the great work is about to be accomplished." This is about as high praise as the *Builder* ever bestows on anything, and Mr. Menocal, who has lived through a good deal of misrepresentation and neglect, ought to feel considerable satisfaction in reading it. It adds, however, a suggestion which is interesting, although we fear that it will not be very well received on this side of the water. "Is it still," it says, "too much to suppose that Great Britain and the United States will throw aside their jealousies, and, for once, coöperate together for the accomplishment of the greatest work that human skill has yet devised? Is it too much to hope that these two great nations will stop their useless squabbles as to which is to receive the greater share of the advantages the canal will create, and unite together to construct that source of wealth for all the world? They are neither of them likely to lose much by it, if we may be guided by past history." The idea of "British" coöperation in an engineering work on this continent would give almost a fatal shock to the nerves of some of our politicians, but worse things might happen to the world. It is probable that, next winter, an earnest effort will be made to induce the United States Government either to assume the construction of the canal or guarantee the bonds of the company. In either case, the United States would have to assume about a hundred million dollars of obligations, and there is sure to be a determined opposition to this; but it is quite conceivable that the English Government might make an offer to share the responsibility, in a way which would not only insure the construction of the canal, but please the people of the United States. Whether it is likely to do so is another matter. International affairs, particularly those between the United States and Great Britain, appear to be carried on after the manner in which rival dogs negotiate over a bone, and an honest effort to help in a good work would be a novelty in diplomacy.

CITY GATES.[1] — III.

Fig. 19. Puerta del Sol, Toledo.

THE advent of heavy artillery toward the close of the fifteenth century led to radical changes in the dispositions hitherto adopted. Loop-holes for cannon were introduced in the curtains and in the towers, which were maintained as Transitional; the battlements were modified for the accommodation of the harquebusiers; the bays were still further enlarged to allow easy passage for the troops with their artillery, which was stationed on outworks [gate of Flavigny].

Before quitting the Middle Ages, let us recall the gate of Saint Vincent, at Avila, in Spain; the Puerta del Sol, at Toledo (Fig. 19), an interesting example of Moorish military architecture; and, lastly, the Bâb el-Futûh, at Cairo (Fig. 20). The City of Cairo has several gates, the most beautiful of which are the Bâb el-Nasr (Gate of the Help of God) and the Bâb el-Futûh (Gate of Victory). The founding of these goes back to the time of the Caliph Mostansir Billah. They were built in the eleventh century. The Gate of Victory (Fig. 20) has a great deal of character, with its round towers and its huge coving with caissons and roses. It is made of freestone laid in regular courses. The arch voussoirs are notched and constructed with the greatest care.

With the Renaissance begins the decline of this branch of architecture. City gates lost at this time all the interest that had attached to them from the standpoint of a programme realized. Their defensive character disappeared, and constructors, finding themselves no longer guided by real needs, could give rein to fancy. This meant decadence. Many of the Renaissance gates are, however, extremely interesting, but purely on decorative grounds. Such is the Puerta Visagra at Toledo (Fig. 21), the decorative disposition of which is very bold and imposing. The gate of Santa Maria (Fig. 22), at Burgos, is important as a specimen of the Transitional style; the defences here are simply a fanciful variation of an old theme, which, nevertheless, had its *raison d'être*. The gate of

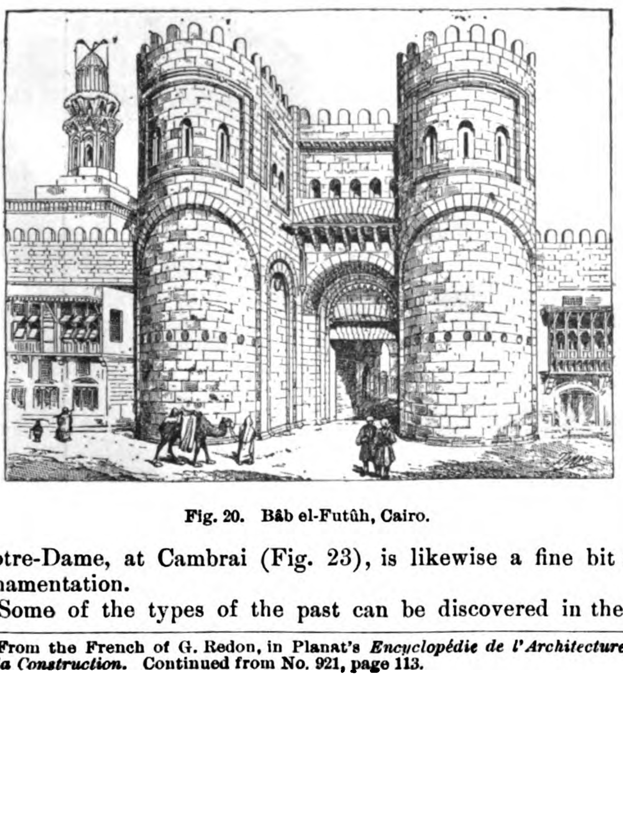


Fig. 20. Bâb el-Futûh, Cairo.

Notre-Dame, at Cambrai (Fig. 23), is likewise a fine bit of ornamentation.

Some of the types of the past can be discovered in these Renaissance structures, although under very decadent forms; but, in the seventeenth century, all that was originally characteristic of the city gate had disappeared. The downfall was, in fact, complete. The gate was transformed into a Roman triumphal arch. Such, for instance, is the Porte Saint-Denis,

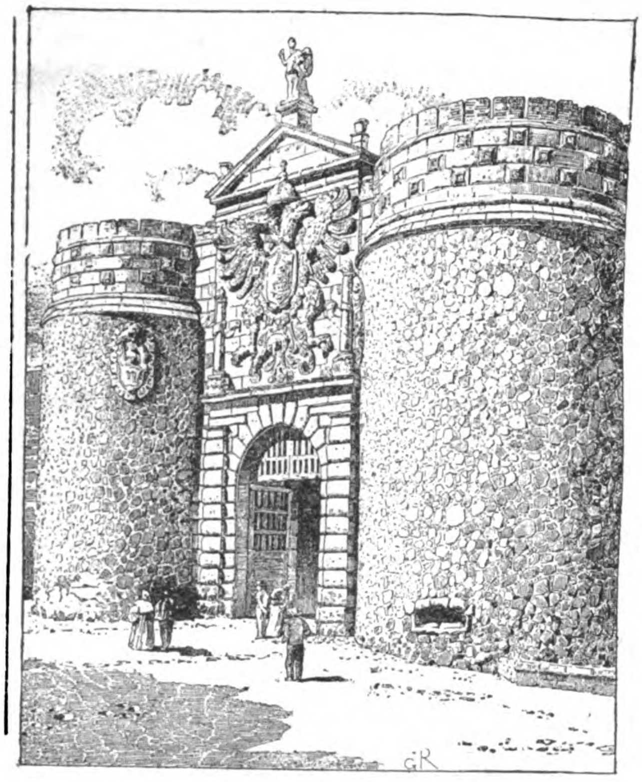


Fig. 21. Puerta Visagra, Toledo.

occupying the site of the old Porte Saint-Denis of Charles V (Fig. 24). It was designed by Blondel, and was dedicated by the city, in 1673, to the glory of Louis XIV. The constructor was Bullet, one of Blondel's pupils, who afterward erected the Porte Saint-Martin. The sculptures are by Girardon. In his work on architecture, Blondel complains of having been forced to pierce the pedestals below the pyramid; he would have preferred these to be solid. The pyramids, or, rather, obelisks in relief, are covered with ancient trophies interspersed with shields and the arms of the Dutch cities which the king had just subjugated.

The Porte Saint-Martin, erected by Bullet in 1674, was also designed to commemorate the victories of Louis XIV.

The gates of the seventeenth and eighteenth centuries nearly all had a single central arch. One with two arches was, however, constructed by Blondel in 1674, in honor of

Fig. 25. Barrière du Trône, Paris.

Louis XIV, on the Quai Saint-Bernard, at Paris. It was embellished with bas-reliefs by Tuby.

During the present century city gates have been converted into mere barriers at which local duties are collected. A few of these are monumental in character, one of the most striking of

[1] From the French of G. Redon, in Planat's *Encyclopédie de l'Architecture et de la Construction.* Continued from No. 921, page 113.

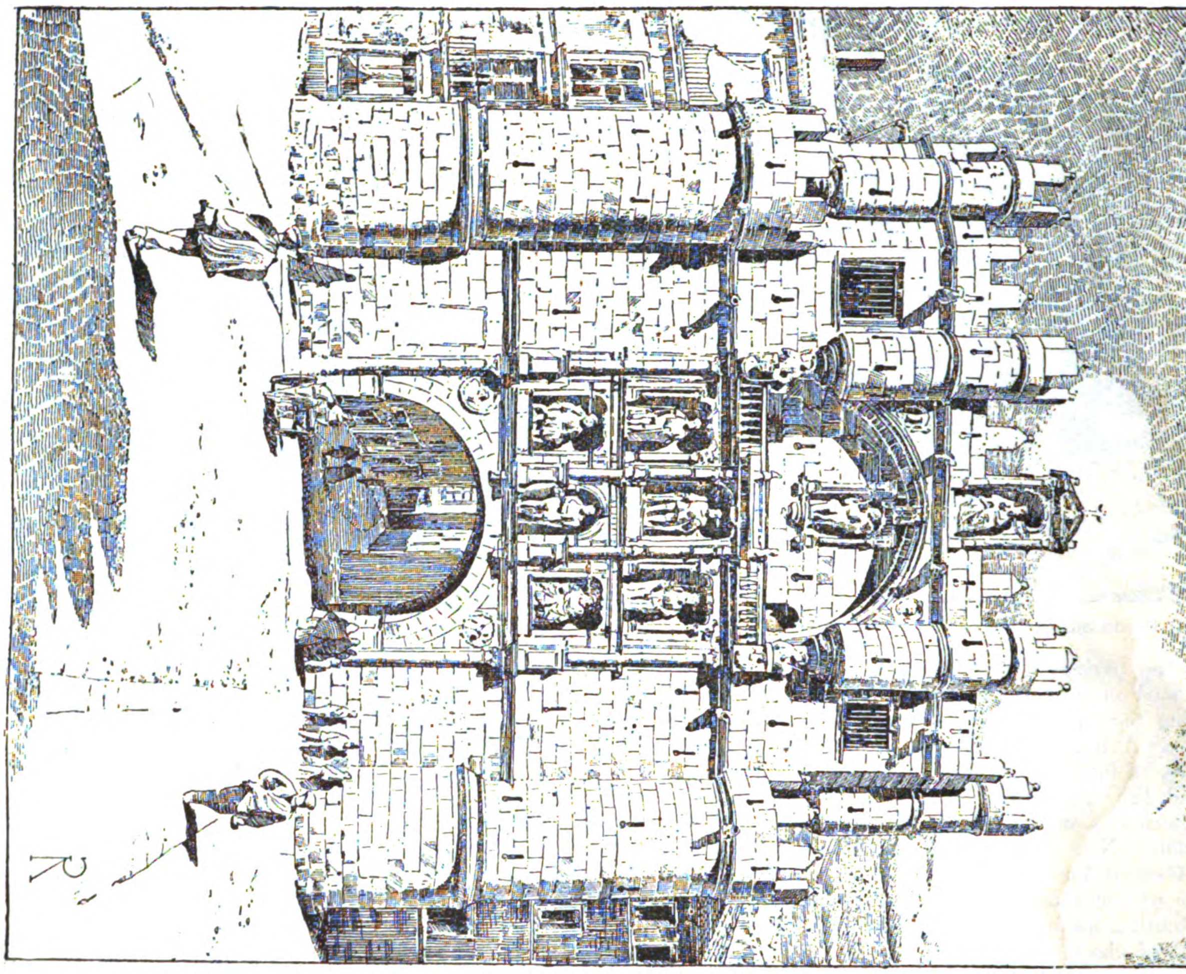


Fig. 22. Gate of Santa Maria, Burgos.

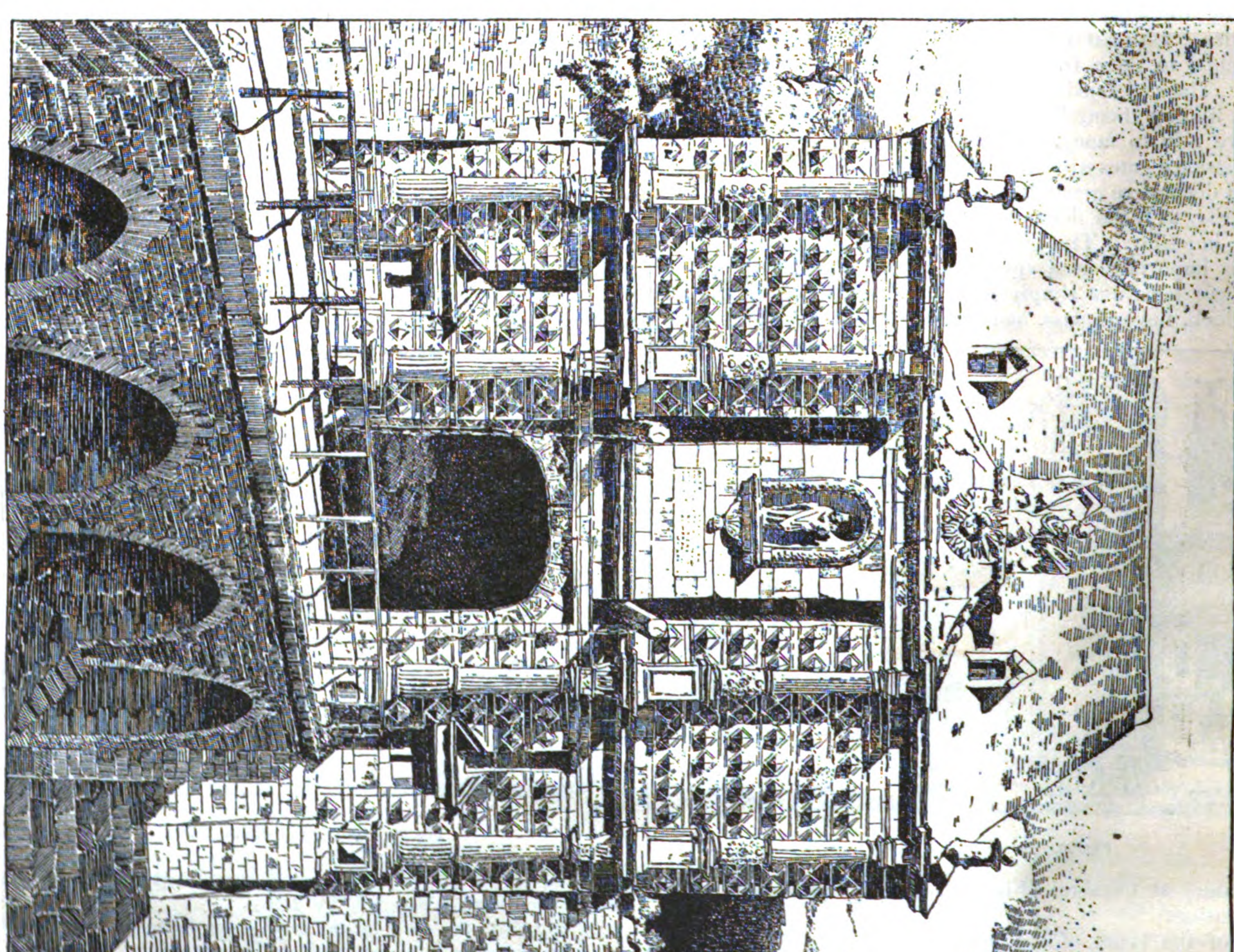


Fig. 23. Gate of Notre-Dame, Cambrai.

which is the Barrière du Trône (Fig. 25). It is by Ledoux, who had been commissioned, in 1783, to build the barriers of Paris; he erected about sixty, but only those of Montrouge, La Villette and the Throne are now in existence. To-day we are constructing neither gates nor barriers. This noble architectural motive is no longer demanded. G. Redon.

COHESIVE CONSTRUCTION.[1]

ITS PAST, ITS PRESENT, ITS FUTURE.

Gateway to a Bohemian Farmhouse. From *Architektonische Rundschau.*

Ladies and Gentlemen, — Mr. President:

Having learned through the courtesy of your worthy Secretary, Mr. Alfred Stone, that the annual convention of the American Institute of Architects was to take place conjointly with the general convention of architects, to meet during the World's Fair, and in acceptance and permission of your most worthy and illustrious President, Mr. Kendall, I wrote for that occasion, and I will have the honor of reading before you this second essay on cohesive construction, which I beg you to receive, not as coming from my insignificant personality, but as that of a member of the Spanish School of Architecture in this select assemblage.

I believe that you will concur with me in saying that the theme, "Cohesive Construction, its Past, its Present, its Future," is what, technically speaking, may be called an architectural one, although the word "construction" records and implies at the same time engineering and constructive subject, and is as much in place in a convention of engineers as one of builders; why not. Precisely when we observe the inclination of some architects of the present epoch to make a sort of distinction between the work of the architects and that of a building-engineer in an architectural structure, as if all of the constructive parts of an architectural building were not inside of the faculties and responsibilities of the architects, and as if it were possible to conceive of an architect who cannot understand the construction of his age. Otherwise he could not be thoroughly familiar with the needs of the architecture of his time. Therefore, we may safely admit that the theme, "Cohesive Construction, its Past, its Present and Future" is an architectural theme, and one which every architect can and should regard as within the professional faculties and artistic, scientifically-applied knowledge.

What is cohesive construction?

We have made and already published a definition of construction in general, and divided into two classes:[2] The first is the construction we shall call "Mechanical Construction," or by gravity. The second we shall call "Cohesive Construction," or by assimilation.

The first is founded on a resistance of any solid to the action of gravity when opposed by another solid. From these conjunctive forces, more or less opposed to one another, results the equilibrium of the total mass, without taking into consideration the *cohesive strength of the material set between the solids.*

The second has for a base the property of cohesion and assimilation of several materials, which, by transformation more or less rapid, resemble nature's work in making conglomerates.

We can give another definition more precise and comprehensive for both systems in saying that the first, or gravity-system, is one where all the pieces can be separated, one by one, and then rebuilt in the same or similar manner. To this class belong the pyramids of Egypt and the Greek temples, etc. In "cohesive construction," on the contrary, the components cannot be separated without destroying the integral mass. To these belong the Babylonian walls of hydraulic mortar; the vaults and cupolas of the Assyrian, Persian, Roman and Byzantine; the Antique and Middle Ages conglomerate construction.

The structures built by the "gravity-system" can be at any time taken down in the pieces out of which they were formed, while, on the other hand, man cannot again use the parts of "cohesive construction" for modern buildings, and only Nature, with its slow but sure work of disintegration, can take from this style of buildings its material for her immense laboratory.

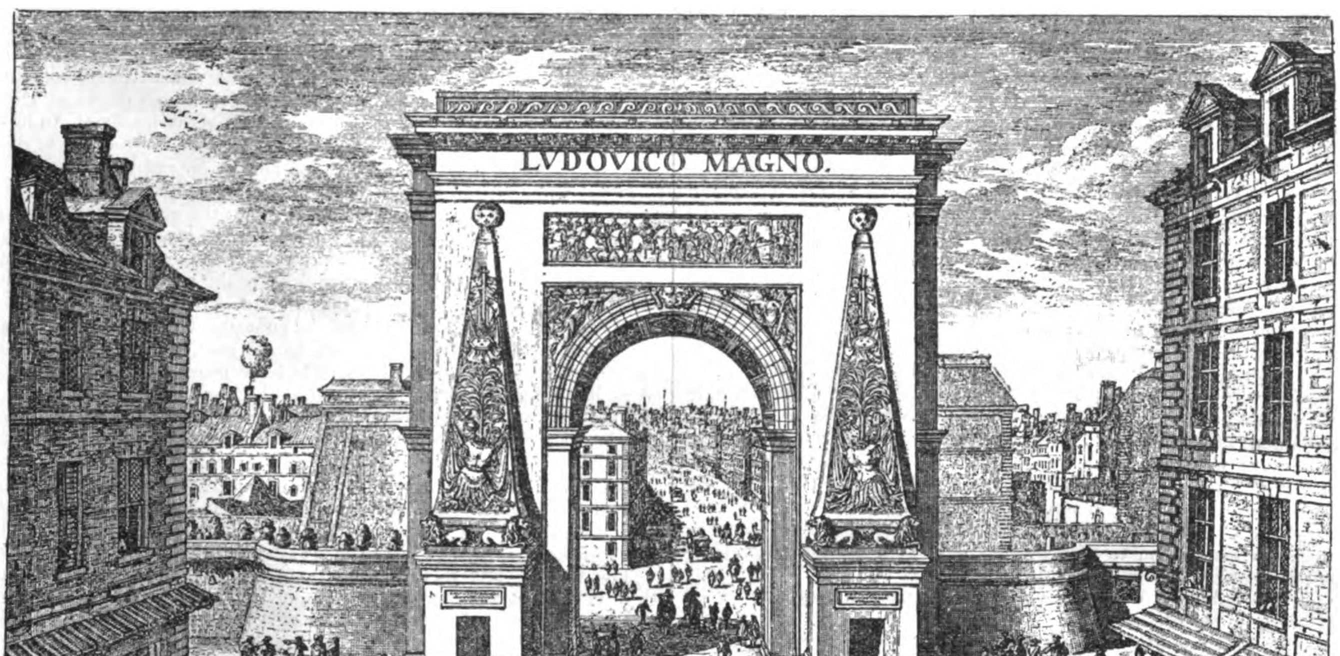


Fig. 24. Porte Saint-Denis, Paris: after Pérelle.

The materials employed in the construction by gravity only require the physical and mechanical quality of hardness, while for the "cohesive construction," the materials must not only have proper physical conditions, but it is absolutely necessary to take into consideration the chemical properties of the substance employed. Therefore, the use of the cohesive system was rendered impossible to many nations that had neither the material nor the knowledge of its

[1] Paper by Rafael Guastavino, from the Spanish School of Architecture, read before the Congress of Architects in connection with the Columbian Exposition, Chicago, August 5, 1893.

[2] "*Cohesive Construction applied to Timbrel Arches.*" First and Second Editions.

use at their disposal; while, on the other hand, all civilizations and all nations could make use of the gravity-system.

The base of the best of these materials are mortars that do not require exposure to the air for their transformation or setting qualities; that is, hydraulic limes and cements, and principally of the quality of Portlands. All that material which your popular Mr. Daniel H. Burnham has employed in embellishing the outside of the structures of the White City with marvels of artistic architecture is cohesive material, although of limited life. Cohesive material holds together and resists equal tests of pressure in whatever position it may be placed.

A brick or stone wall, to be a cohesive wall, must have the resistance required as brick or stone masonry in whatever position the tests may be placed or applied; that is, sideways, applying on both sides at the same time the tests, or in a vertical direction.

Attempts have been made in all civilizations and in all styles of architecture, since the most remote times, to build in the cohesive-construction system. We see Assyrian, Persian, Greek, Roman, Byzantine, Turkish and Arabic monuments; in fact, in all the antique and Middle-Age civilizations.

Investigations have given the conviction that the remotest peoples who were most successful in developments and inventions in their system of construction were the Persians, for which reason they can be considered the fathers of the cohesive mode of construction.[1]

There is no doubt that in the days of the dynasty of Achæmenides (800 B. C., which was ended with Darius), was the era of the real development, giving the new forms of abutments for domes and arches.

From that civilization was taken the practice of the system used by the Greeks and Romans, because the Pantheon of Rome, as well as the domes and pendentives of the Caracalla Baths, are specimen buildings taking the idea from the antique Persian monuments, with which the architect of the said buildings must have been familiar or have had some knowledge.[2]

That the Byzantines were wanting in the knowledge of this system when they began Byzantium (272 A. D.) was proved by the poor buildings of the time of Constantine (See Zosimus, *lib.* 2), for good, skilled men and architects to assist him in his first attempt were lacking, for which reason no building of the epoch of Constantine remains to-day in antique Byzantium.

The primitive cohesive architecture, which began to have character in the Persian monuments, was well developed by the constructive improvements introduced by the Romans during the days of Augustus and subsequent periods, and also by the Byzantines when they reached their days of splendor, which constituted the most brilliant period of that masonry epoch, from the simple walls to the abutments of vast domes, with their spandrels, niches, pendentives and hemicycles, and which development was always pursuing the condition of maximum strength with the minimum weight of material and space occupied by the walls in relation to the full space of the structure until the decadence, which began about the eleventh century, when the stone-cutters' architects, being conscious of their independence and importance of their own time, took in their hands the reign of the fine cut-stone epoch, richly elaborated to the impossible, preparing the Renaissance, passing throughout the Western or Gothic architecture.

But what have the Persians, Romans and Byzantines left?

The Classic construction by gravity was in existence, in fact, only in Egypt and in Greece, although we are perfectly in accord with the eminent and well-known Professor Aitchison that "The Grecian architecture was purely an invention. *The constructive principle was that of Egypt.*" Well enough; Greek architecture was not the complete architectural conception of Greek civilization, but they applied the Classic art lines to the principles of the gravity-system of marble construction to such perfect development that no civilization has been able to improve upon it.

Can the cohesive construction say the same, in any day of its existence, in any civilization?

During all these fifteen hundred years that the cohesive construction has been in practice, all the improvements and inventions have been as we have said, toward the idea of obtaining the maximum strength with the minimum weight and ratio of the mass of materials compared with the space covered.

In the first attempt of the best of their buildings (Sta. Sophia) they did not succeed, because the building collapsed from defects in construction, aggravated by want of uniform conception of construction; masonry was mixed with wooden ties.

These ties, which are the sinews of the cohesive construction during construction, also after the building is completed and set, were exposed and treated in such a way that all these buildings were of short duration (272–337 A. D.). The danger (as in the majority of buildings of our days) was constant, as is evident from the fact that none remain as mentioned, including the first Sta. Sophia, in one of those tremendous and terrific conflagrations and riots, when loss of life in Byzantium was counted by dozens of thousands (532 A. D.), destroying all the buildings of that epoch in Constantinople.

New buildings were started forty days after that terriblo calamity by Justinian and Theodora, under the direction of the Asiatic Greek architects Anthemius and Isodore, with better conception and results, for which cause we can yet admire several of them, principally Sta. Sophia.

But although in this second attempt in the epoch of Justinian, they realized what Constantine could not, other defects appeared after, which compelled them to add new reinforcements to their masterpiece building, as new abutments; from which it appears clear they have not succeeded in giving to the system a spontaneous and æsthetic character, as the Greeks have done in treating the Egyptian construction in gravity-system, for which reason all this Byzantine period has passed into history as an epoch of transition, and we by no means find it necessary to admit this historic remark in comparing the artistic and mechanical perfection obtained in the best periods of cohesive construction, the artistic and mechanical perfection of the Greek era.

It is true that to improve, and to arise to classicism of the Egyptian "stonehenge" construction, or by gravity, is *apparently* easier than to get the same results in the primitive Persian construction (base of the cohesive one), although several centuries have passed between the primitive Pharaohs, and the people of the century of Pericles, proving that perfection in architectural art takes a *fair number of years.*

The comparison between the Egyptian and the Greek architectural work, inside the gravity-system (and we refer both to the constructive and artistic conception) passing through Assyrians, can be equally made between the Persian architectural art, inside the *cohesive system*, passing through the Byzantine and modern periods to the future *classic cohesive construction for which this century has been so successful in obtaining great and new elements of success.* In fact we are new in regard to the advancement of the building art inside of the cohesive construction, as the gravity-system was, in the period of Egyptian and Assyrian, before the great era of the great art. We have not reached yet in cohesive construction the parallel of the Greeks in the gravity-system.

The Egyptian architecture, with its gravity-system of construction, can be compared to the stone age in the earth's formation; the gravity construction has not individual life. The stone is cut out from the quarries, placed dead in the building one over another. But the Persian architecture, in its cohesive construction, is like the period of animal formation; that is, the cohesive material has natural life, its material components have elements that change its condition and increase its strength by their self-elaborating elements. Egypt is the *repose* in the sustaining parts as well as the sustained members. In the Persian construction the sustaining elements as well as the sustained constituents have, and should have, constant work of self-abutment and thrust, as the first principle of their existence. To select and put together the right material, to have the said elements of natural life in the materials, *is one of the most important parts that the architect has to play in the cohesive system.*

In the dome of Sta. Sophia, for instance, they selected brick of such small density that they would float on water; the cement or hydraulic limes, natural or artificial, was also a matter of essential care.

All these new conditions and complicated elements of construction, necessary to the cohesive construction, could not be solved in the state of science at that old period, for which reason the most advanced period of architecture on cohesive construction, say the Byzantine period (272–1100), was, as we said, an epoch of transition, because these buildings, although architectural in their lines, were like some specimen of the animal kingdom whose skeleton is not yet well pronounced, does not correspond yet to a well-finished, developed and perfected body, as, for instance, *the man*, who, although constructed with well distributed and built forms of *flesh*, giving his beauty, nevertheless it has in the interior skeleton a bond-system which gives the maximum of strength and the minimum of weight and capacity to the body, which can be well compared with this wonderful invention of the steel skeleton construction of our days.

The antique and mediæval cohesive materials were slow. When they could not find natural hydraulic limes they used limes made ydraulic to improve its condition of cohesiveness and quick-setting to a certain degree, by mixing a portion of burned clay, giving in that way to the lime-mortar the condition of an aluminium silicate one. But you will imagine the great number of difficulties and constant danger during the construction of the heavy domes, having only such poor-setting materials. The *piedra pomez* (lava of St. Vesuvius) and pozzuolana lime, which probably was the basis of the Roman cement and mortar, was no better quick-setting, hence, the necessity of enormous thickness, enormous centering and long, long time needed to obtain the strength necessary to enable them to deliver over the building.

The Persians, with their forms of conic dome, could avoid centering by advancing the courses of brick proportionately to the curve in each course, closing each ring, giving time to have some cohesion before they put the next one, and then advancing more. But always at the cost of a great amount of time, which was their only resort; but domes like the one built by the Romans, with centering, although reinforced and helped a great deal by the use of some courses of brick laid flat, were also laid with the same slow setting-material, as can be seen yet in specimens. But a heavy centering could not be avoided, because this material that constitutes at present the domes, and is now strong and massive after centuries of assimilation and transformation, we can imagine was at first, for months and months. of very poor strength; and it had to bear, in

[1] See A. Choisy, "*Extract de la Gazette Archeologique de 1887.*"
[2] See Aitchison, "*Byzantine Architecture.*"

addition to what it now is supporting the weight of the water of the material, the weight of the great number of workmen and the pounding, which it would be very serious to risk without heavy centering before giving over the structure to use. And there is no doubt whatever that, in regard to the Pantheon dome, the centering must have been of enormous cost and the material and labor surely, as we will see below, more expensive than the material and labor of the dome itself, that we admire to-day.

We say to-day, because the dome that now exists and covers the Pantheon, attributed to the time of Augustus, is not the same one built for Agrippa, or by Agrippa. The roof of that time collapsed or was taken away, perhaps for defects of construction as we have said in regard to the dome of Sta. Sophia, happening later. We have a doubt that it was a dome, because the plan of the Agrippa building was a square one, and it is now discovered (that is last year) that the dome, and it seems also, the round wall, was built by Adrian about one hundred and fifty or two hundred years after.

This reference I have from a member of the Spanish Academy of Arts, that the Spanish government has in Rome, the illustrious architect, D. J. Pavia, who says, "a crack was discovered last year in the dome of the Pantheon, not from any defect in the dome, but, as always happens, from some trouble in the foundations, and there, in consequence of currents of water of temporary different levels near by. The French Academy in Rome offered to the Italian government to make at their own expense the scaffolding and repairs. To their surprise they discovered that the bricks (as is always the case in the antique Roman bricks) have the mark of the builders, but they have not the mark of the time of Augustus, but the mark of one hundred and fifty or two hundred years after, that is, the epoch of Adrian, whom you know has passed into history as one of the most able architects, and who was known to have a hobby for construction."

This dome is constructed, first — by a series of small circular arches at the base of the spherical dome, and after springing at the centre or key of the said small arches and forming the centres of the caissons or panels, they built in the direction of meridians of the sphere a series of ribs or arches. All these arches were built not with the bricks laid flat, as is attributed to all the arches of the Roman epoch in that class of construction, but laid on edge, like voussoirs, for which it was absolutely necessary to have very heavy centres, from side to side of the dome. These ribs are the bottom face of the caissons or panels, which caissons were made afterwards with casting materials, a concrete made with a porous stone like piedra pomez or lava of Vesuvius and lime-mortar mixed with puzzuolana, which stone is commonly used in a similar way in the islands of Mallorca and Mahon in Spain. You can imagine that a dome built in that way and with such tremendously heavy thickness of brick, for ribs it was necessary to have a very heavy centering, and yet well anchored; and as the material was of the kind of common hydraulic material which requires exposure to the air for its transformation, although less exposure than the common lime — it takes months before it has the necessary strength to support itself, and in consequence, not only must have been the heavy centering necessary, but besides many months before the centres would be removed.

Another remarkable epoch inside of the development of the cohesive constructive period, will you permit me to put on record in this essay, on account of its influence on modern architecture of this country.

The Byzantine and Moorish-Spanish architecture representing the architecture of the far west, known in the days of the Christian world.

The Imperial edict of Constantine declaring Christianity to be the State religion, transferring at the same time the capital of the Roman Empire to Byzantium, put the Eastern European and Western Asia Jewish race and other sects, for the first time after Christ into emigration, giving occasion perhaps for the late invasions of the Arabs and Mussulmen.

Spain was the principal attraction for emigrants, not only on account of climate, richness and the already relatively large commercial relations with the Greek Empire, which relations in the Byzantine period had made legendary names, as Roger of Lauria and others, but also on account of freedom and religious tolerance, as is always the case in new countries.

Byzantine churches and cathedrals were built in Spain at the same time that synagogues were tolerated. These edifices were of remarkable constructive character, and it is a matter of congratulation that American architects, in their impartial views of artists before historians, having revindicated for Spanish history of art, a page which was erroneously conveyed by Northern European historians. Fortunately history written with architectural monuments could not altogether be misconstrued.

The great Richardson in his travelling studies through Spain with some of his distinguished disciples, now prominent architects, discovered for American activity a magazine of Spanish, Byzantine and Romanesque Architecture, namely, Cathedrals of Salamanca, Zamora, Toro, Avila, Gerona, Segovia, las Puellas, etc., etc., and monuments in Catalonia, Valencia, Castilia and Leon, giving new motives to his great activity and to the learned scholars, to-day, represented by Shepley, Rutan and Coolidge; Andrews, Jaques and Rantoul, of Boston; Potter, Robertson, Eidlitz, Gilbert, of New York and other enthusiastic disciples of the greatest American architect of his time. But if, as Spaniards, we must appreciate and profoundly recognize the value of the preference of the Western Byzantine to the Eastern Architecture, perhaps as we have said, on account of its constructive character, externally and internally, we as simple, humble apostles of Architectural Art, and in the interests of the good examples for the youth initiated in architecture, we sincerely congratulate the opportune reaction arrived from firms called Richard Hunt, McKim, Mead & White, Post, Peabody, Atwood and others, who assisted in time to avoid the disturbance that in the young generation always made genius, like Michael Angelo in Italy, and Churriguera and Berruguete in Spain, in their pernicious effects for the advancement of true art. For which cause, the nation should be proud for that reaction as much as to the healthy art influence that the masterpieces of architecture of the World's Fair buildings, due principally to the never well-appreciated noble tendencies of the architects, Burnham & Root, when they recommended the distribution of work, that so brilliant a result has been given, not only to the credit of this nation and to the city of Chicago, but also to influence that in the mind of youthful architects and great part of the public, as a teaching medium of good school. And, although, we think that the architect must not be an archæologist, and that building outside of the classic style, as for instance, the Transportation Building by the well-known firm of Adler & Sullivan, for its originality and typical romantic style is opportune, and necessary to break any monotony, if it exists, nevertheless, in the present case, at the close of the decade of the Richardson reign of the Spanish-American Byzantine and Romanesque, when no more such powerful genius seems to appear, it was necessary that classic display as regulator and to normalize the effects of the illumination given by the great star.

Returning to our theme, the character of the most of ancient Byzantine and Romanesque types in Spain was of monolith construction made of conglomerated material. The walls and floors (like other specimens relatively modern) were, some of them, of stone and concrete, others concrete alone. For the second one it seems that moulds or heavy centering were used, giving to the material an appearance outside like a cast mass, as can be seen by specimens of walls with large portions of floors, of vaulted ceilings, which are yet in existence, showing perfectly their construction.[1]

Some domes were built with stone and packed with the same casting material referred to, probably without centres, because there is small ashlar, and it is yet customary there to build domes of that kind, using only a stick pole as a radius, and closing each time the ring of stone, so no centering is used in that case.

Same was the construction in the period of the Arabs and the Moors. It was that of the rest of Spain, in Byzantine style, and although the Moors in their florid epoch arrived at classicism in their way of treating all the constructive material, from wood as applied to ceilings (flat or domed) doors, etc., to the marble work casting and ceramic materials, etc., used in their interior Classic decorative epoch of the romantic styles, the use of wooden materials, for instance, for the stalactites in the interior constructed decorations of their dome ceilings and arches, which is a plain contradiction, and a misrepresentation of the natural stalactites, in that material, proves that they were by no means at the same level in architectural constructive advancement as their neighbors of the north and east contemporaries: Ending here, all we could to-day say in regard to the cohesive construction of the past, whose specimens all of them convey that *the classic cohesive architecture* has not been in existence. Will it exist in the future?

Unfortunately, the present system of steel-skeleton construction is the opposite extreme of the Byzantine construction in meeeting the needs of true art. There was all flesh, and here all bone. Here is the human skeleton only enveloped with the skin, without any more artistic life and soul, than a brain purely mechanical and engineering can give cool calculation and nervo-physical result, which never will be architecture, and if it is architecture, it is in its infancy for want of artistic development or treatment.

This is the character that is growing at the end of the nineteenth century, and it could be called architecture of the nineteenth century. The engineers of this epoch have brought new elements of originality to the observing architect. That is a fact; but it is also true that these new elements are, as we have said, the real architectural character of this epoch, which will pass to history as one of transition on that account, and like the Byzantine epoch, we need besides that which we have, something else perhaps not yet devised.

Have we not got just what the Byzantine wanted? That is, the steel-skeleton construction with the steel ties, or do we need what the Byzantines and Romans had? That is, the flesh, the artistic masonry architecturally treated?

This steel-skeleton combination, together with the massing new elements given by the manufacturers of building material, as Portland cement, for instance, and other materials that for years have been unconsciously accumulating to the end of the century, perhaps to the benefit of the architect of the new era: *Will they be, if well developed, the beginning of the era of the classic cohesive construction, as the Greek era was for the classic construction by gravity?*

The architect could cover now the skeleton, not as we have said,

[1] Near Barcelona, between the town San Andres and the river Besos, we saw about twenty years ago, the ruins of a monolithic building of that kind of great importance.

with this thin skin, without flesh, dry, without life, with this want of soul which gives the inartistic physiognomy so detrimental to all real architectural work, and which is what happens with some of the edifices of steel skeleton covered with the mean coat called fireproof, which, if it is fireproof in itself, is not so to the extent to protect and give beauty to the skeleton; as, for instance, it will not protect, neither give beauty to our animal bond system, if we have the skin and nerves only over the bones! It would be very funny to look, ourselves, like Egyptian mummies.

Can anybody admit that if the man has the bond and nervous system, entrails and the senses which are the essential parts of latent life, that there is no necessity of flesh? Certainly not! We know the man can live, but cannot resist the natural elements. Same is the case in the skeleton building construction that is covered with this mean mechanical coat, so-called fireproof, with which the skeleton construction does not and could not resist the fire, as is just what one of your oldest and most prominent engineers, General Sooysmith, with his incisive literature, and although he is an iron-building contractor, is for years insisting with much reason, that the skeleton construction is an architectural imperfection and a menace, for which something must be done.

But we do not mean that what is wanted, in the steel skeleton is to cover it, with that material called fireproof in the way that the said worthy engineer does not admit is fireproof: and thus we can call it mechanical fireproofing, because it has not any architectural form at all; neither do we mean that in order to correct the form and give architectural appearance, one must use other kind of fireproofing which consists of wire-lath of different patterns, giving, may be, architectural appearance, covering it with plaster or other casting material but leaving dangerous empty places, which we call false construction, because that will be, as if nature had covered our bones and nervous system with skin alone, as mentioned before, but giving, besides, false inflated forms, such as the false forms of a toy, so as to give artistic lines to giving only the appearance; the bone and nervous system will not be protected better than in the first case, on the contrary they are more exposed, besides that the monstrosity will be false and undignified, which is what happens to all the permanent edifices when the wood, wire laths constitute the false artistic form.

The true architectural construction, the natural and legitimate construction, in architectural art, must be just as Mother Nature teaches us in its most perfect work, the man itself.

The ancient cohesive construction has given us valuable elements of constructive form; that is, masonry materials and new constructive forms of masonry. The engineering advancement of the present epoch has given us the skeleton, that is the bond, and the nervous system. The manufacturers have given us also new materials, improving what Rome and Byzantium have done. Why does not the present-epoch architect now take all these elements of construction together and satisfy what the engineer work requires as illustrated by General Sooysmith, in recommending so highly to do something, to protect the skeleton construction, and satisfy also what the no less pertinent thought of the eminent Professor Aitchison suggests, who says: "Although iron has been used largely for various structures, it is not likely that it will take the place of more time-honored materials, at least for monumental buildings."

But, unfortunately, the present cohesive architecture also is in embryo, due to the poor treatment of the new materials, and perhaps to the fact that it has not yet passed the period of controversy between the partisans of concrete for cohesive material and the partisans of the brick and tile, clay and cement system. The partisans of concrete have for a model the conglomerate of Nature, and the antique concrete construction. The partisans of the brick and tile clay with cement system have as instances the Babylonian construction, some Roman and Spanish specimens, and the brilliant results in strength, in quicker setting, lightness and cheapness, four elements of success in construction at any time.

For nearly a century after the invention of Mr. Parker in regard to cements, the concrete partisans have been trying to introduce in the building practice the system of cohesive construction of concrete for walls, ceilings, etc., and no successes, it seems, are yet in prospect to compete with the brick walls, which are better adapted than for ceilings, and we think it is due, as we have said, to its weight, to the necessity of use of centres and slow condition of *modus operandi* inherent to the system, as can be illustrated by comparing arches built in concrete with others built in clay tiles and cement.

The domes built in tile, for instance, in the Banigan Chapel in Providence, from plans of the firm of Messrs. Stone, Carpenter & Willson, the senior partner of which firm is your worthy Secretary of the American Institute of Architects, and present with us, have about thirty-six feet diameter, and are only three inches thick, supporting the full weight of the roof. The elliptical dome of the driveway of the new Boston Public Library has forty-two feet for the longest diameter, and is also three inches thick and has received very severe tests. The elliptical domes of the new Court-house at Taunton have for one of them the longest diameter seventy feet, and this is four inches thick only, and supports the full fireproof roof of about 7,000 square feet surface, which is one of the most remarkable specimens in existence. It was built in two weeks, beginning in June, and is to-day covered over with a high roof with fireproof material weighing about one hundred and twenty tons.

The tubular or hollow dome of the Central Congregational Church at Providence, from plans of Carrère & Hastings, fifty-four feet in diameter and carrying a lantern weighing twenty-four tons, is another specimen that together with the artistic condition of the building will form, like the Boston Public Library, by the firm McKim, Mead & White, and the St. Joseph Seminary of Archbishop Corrigan, from plans of the well-known firm of William Schickel & Co., a page in the American history of constructive art. These specimens positively, we think, were impossible to be built in concrete, with such dimensions, strength, thickness and in so short time.

But if in ceilings we have some advancement in cohesive construction in opposition to the mechanical construction that we have considered, viz, the flat, hollow-block ceilings which work as voussoirs, and correspond to thin fireproof referred to, the cohesive walls are not yet well understood in practice, because, although we have on hand and are using cohesive material, they are not well treated in their manipulation, resulting in general cases in a wall that, if it can resist vertically the pressure technically admitted for common masonry walls, it is not equally resistant if the pressure is applied sideways, which shows that the wall is not a cohesive one. It also can be proved that it is not cohesive by the fact that in nearly all the walls built to-day the mortar joints are only working as a cushion, because it is generally known that we can take brick from the said wall, clean of mortar, and pretty ready to be used as a good second-hand material.

That is due to two facts: one due to the poor manipulation, the other to the condition of the climate. Both can be corrected, and are in the hands of the architect to correct in the present state of advancement of material and knowledge.

The first case depends on the fact that the general materials used for cohesive walls here are the cements called Rosendale containing a small quantity of silicate. They are, as you know, good and quicker setting than Portland, but the man in charge of the manipulation manages to use them as if they were common limes, or as if Rosendale was given as much time to be used as Portland, keeping the cement mixed, and running hours and hours if not left until the next day, so we can say that no Rosendale is used in the proper way. They are never used in their own *first setting;* they are used in the so-called second setting, so we must consider that Rosendale cement, in the way that it is generally used, is not a cement, but an hydraulic lime that requires exposure to the air to have a slow setting, which always takes months.

That can be seen very easily in observing that in good, dry weather the outside joints of any wall built of Rosendale cement used in that way are in a few days very fairly well set. But if you take some of the bricks, and observe the conditions of the mortar in the interior of the wall, it is noticed to be comparatively fresh in summer, but in winter in a very unsatisfactory condition, if not frozen, due to the fact that the outside mortar has had the chance to absorb from the atmosphere the carbon necessary for its transformation like lime-mortar, and the interior is kept for months, or it may be for years, in latent life, if it is not killed already by freezing weather.

These defects cause every year a great number of accidents, that we can call *May accidents* (on account of the rains of that month dissolving the frozen water), in all countries where freezing weather prevails in winter. This is just the same in New York, New England, and all the Northern, Eastern and Western States, concerning several buildings with this unsatisfactory treatment of materials, to the extent that we feel something must be done. The only remedy that we can find to prevent this heavy responsibility of the architects is, in view of the rapidity required to-day in building in cold weather, and especially in tall walls, to specify that from October to the end of April all the walls must be built with cement-mortar of the quality of Portland cement. Experience has confirmed that Portland cement-mortar in the proportion of one of cement to two of sharp, clean sand can be worked safely to within six degrees below freezing; also, that Portland cement-mortar can resist after being laid on the wall, lower temperature if it has a chance of a few hours of setting, and, in case of a severe night's freezing weather after a day of work, if anything gets affected, it is only the material laid the few hours' later work, and not, as it happens, when other material is used, affecting the whole winter months' work, because the soft mortar has a chance of absorbing the rain-water, in consequence of its unset condition, and is, therefore, repeatedly frozen during all the season. The result of this is that walls in this condition are not walls, but a pile of brick regularly laid one over the other, as if it was a wall: the joints outside are some of them apparently good.

We do not think it necessary to remark that what we have said in regard to Rosendale cement, used as commonly in its so-called second setting; the lime-mortars of any kind used during winter are worse, because the presence of lime is keeping fresh the mortar in the wall all winter, and, in consequence, is more exposed yet to be affected by frost. The practice of some builders of mixing cement in lime-mortar for works during winter is also a bad practice, not only because they have the same inconvenience as in any lime-mortars, but also on account that the cement is not giving to the lime-mortar better conditions than if, instead of cement, they mix in powder of burned clay, giving, besides, a proof of empiricism.

All that clearly confirms that we, like the Byzantines, have not

yet succeeded in giving to the system the thoroughly æsthetic conditions to the cohesive construction that the Greek civilization has done in treating the Egyptian system by gravity, and will be in history in the same classification as the Byzantine epoch; that is, an epoch of transition.

But, nevertheless, the progress of the cohesive construction is concentrated at present here in North America. The specimens in Europe are in brick, built in German type for dome and arches, of reduced dimensions compared with the specimens of work with tiles mentioned above. The specimens in Spain and in Italy, with tiles of the same character as those done in this country, are also notable, but not as important and advanced in perfection.

The concrete ceiling between beams with wire, also for relatively small spans, are other attempts of cohesive construction. We suppose you are familiar with some of these specimens, and all are improvements due to the advancement of building-material of this day. They are (the materials) remarkably good, and constant enough to bear coefficients of safety, especially for clay, tile and cement, to the extent that professors of the standing of Dr. G. Lanza, of the Massachusetts School of Technology, assisted us to succeed in getting and breaking specimens of arches built up to 200,000 pounds distributed load, and for which we hope that the architects of this day can give at the close of the nineteenth century compositions of architectural value based, first, on the experience of the steel-skeleton construction, and, second, on the experience given with the masonry specimens of modern cohesive construction with new materials, which we hope the architect could give to his structures the artistic lines, the hygienic and fireproof conditions inside of the new ideas of construction.

Architects, therefore, have to complete the work, constructing architecturally, completing their work in architectural proportions with architectural materials, just as a work of art is any work of nature, although with its mechanical interior work.

This idea of architecture being so rational and evident in its principles, it is impossible to doubt that simple growth will carry *legal architecture* along these lines, and will form the urban practice of the next century, but not without giving necessary organized form to the profession of architecture, as, for instance:

1. The *landscape architect*, whose mission will be enclosed in the *lemma* of the eminent civil engineer, D. Ildafonso Cerda, in his profound treatise on "*Theory of Urbanization*": "*Urbanize the rural district and ruralize the urban ones.*" Which *lemma* should be to-day the *lemma* of the health-departments, aroused by the architects of all great centres of population, in order to protect the health conditions of the larger number against the lesser. The rural districts around the large city must be urbanized in order to protect the lives of the inhabitants of its metropolis, and the condensed urban districts must be returned to life with fireproof and hygienic constructions and streets.

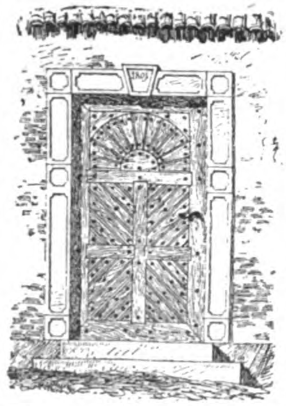
2. *Urban architects*, whose mission on the earth and in the sphere of the tangible is the most exceptional one, because no profession represents in the human limited sphere the universal scientific moral activity of intellectual faculties necessary to a creation, as the architectural profession is the most selected exception.

And that is not only a technical appreciation; no, it is a popular imposition of all classes of society on the architectural profession. The popular feeling is that the architect must know everything, from the most complicated condition of hygiene, all necessities of life, moral and physical, in any building, all natural elements in the earth that could be prevented and taken into consideration in the existence of any structure in any community — all this must be known and be resolved by the architect, for which the profession of architecture since the first Assyrian king, Nimrod, attributed author of the enormous Palaces of Khorsabad, which were no more or less than Biblioteques, and who was the first architect known in history, all architects after him that have existed, and are existing in the fullest acceptance of the term architect, have been and are in the honored profession that, as no other, represent in the earth God, Creator.

To end this small work, I beg to add a few words. Although the ideas pointed out in as short and concise a way as we could inside of the thirty minutes given are, in part, the result of thirty years of constant pursuing of the development of cohesive construction in the Old and in the New World, they were originated by the noble activity and talent of the performers of the new Spanish school of architecture, properly said Catalonians, that for years were pursuing new applications and new directions to the architectural ideas, in view of the new materials and new elements of construction of their time. The names of Pablo Mila y Fontanais (who was there representing what your illustrious Professor Ware is doing here in benefit of the fine arts in this country) and the names of the architects and professors Marquis d' Cubas, D. Elias Rogent and D. Juan Torras, all from the school of Madrid, I beg this select assembly, if it is not asking too much, to give a record of applause as founders of the new Spanish school of architecture, of which I am the most humble disciple.

THE CORINTH SHIP CANAL.— The Corinth Ship Canal was opened, August 6, by the King in the presence of all the members of the royal family, the cabinet ministers, the foreign diplomatic representatives, the principal military and civil officials, and an immense crowd of citizens. — *Exchange.*

LIVE LOADS IN OFFICE-BUILDINGS.



Gateway to a Bohemian Farmhouse. From *Architektonische Rundschau.*

A GREAT deal has been written at various times concerning the live loads which exist upon the floors of ordinary buildings, and quite recently there have been several interesting experiments conducted here and abroad looking to a determination of the exact loads which should be assumed in calculating the supporting members, as notably the experiments of Professor Kernot, of Victoria, which were reported in the *American Architect* of April 15th, and which seem to indicate that under some conditions a load of as high as 150 pounds per foot might result from a crowd of people. That any such amount is vastly in excess of the actual average live load is hardly to be questioned. Indeed, the experiments of Professor Kernot and Mr. Story are interesting without being of special practical value, for the reason that they deal with conditions which would never obtain in practice. In each case the attempt was made to pack the greatest number of persons into the least space, but because 58 laborers can be jammed into a space of 57 square feet, it by no means follows that the floors of a hall of audience should be calculated for a live load of 147.4 pounds per foot, for the reason that there never has been a hall of audience into which people could be packed at that rate. It might be possible that small portions of the floor would be loaded to such an extent, but it would manifestly be a physical impossibility to extend such a system of packing over an entire area, while the large factor-of-safety which forms a very important element of all computations of the strength of materials, is sufficient to provide for sudden concentrations of live load on a portion of a floor, even under the most extreme circumstances.

The writer has repeatedly counted the number of persons in the various portions of theatres and music-halls, without once finding, even in crowded aisles and standing-room, an average of more than forty or fifty pounds per square foot extended over more than a few square feet, while the maximum unit load on the spans of beams, which is a fairer way of gauging the strains on the floor, is very much less, falling in the cases of one theatre which was investigated as low as ten pounds per foot. As a matter of fact, the unit load in a hall of audience is usually less than in almost any other kind of structure, as so much space is taken up by light but bulky furniture, by aisles, etc., that the remaining space for live weight is quite small. For example, the portion of floor occupied by the aisles and seats in the Bowdoin Square Theatre, Boston, has an area of 3950 square feet, the aisles taking from this area 696 square feet and the standing-room at the rear of the orchestra circle 561 square feet. There are 605 seats in all, weighing about twenty pounds each. Consequently the average live load per foot, with each seat occupied, would be only twenty-six pounds, while if the floor-beams were spaced for fifteen-foot bearings and the entire audience was crowded into the aisles and standing-room, — which would be physically impossible, the resulting load would be about fifty pounds per foot, and even if it were possible in such a hall to crowd the people together in the standing room at the rate of 58 to each 57 square feet the resulting maximum loads on the beams would be only 93 pounds per square foot.

There are, of course, some kinds of floor loads which can be predetermined quite accurately, and there are some conditions which require a very wide margin of strength, in order properly to provide for such over-loading as might possibly occur. An instance in point is a warehouse recently built on Purchase Street, Boston, the lower stories of which were to be used for the storage of iron. The first floor was made in places sufficiently strong to sustain safely an applied load of 2,500 pounds per foot, while the upper lofts were assumed to be sufficiently strong for miscellaneous storage purposes, when calculated for 250 pounds live load per foot. But the attic was subsequently leased to a publisher who proceeded to load the floor with books piled ten feet high in such a manner as to create strains of 350 pounds per foot, thus reducing the factor-of-safety from four to less than three. But when the loads are as variable as those which exist in office-buildings, with the addition of occasional heavy safes, long rows of law books and constantly changing number of people, the problem is by no means solved by ascertaining how many laborers can be packed into a space of 57 square feet, especially as, since the introduction of the skeleton construction, with the resulting enormous buildings of twelve to thirty stories in height, the architect is obliged to figure very exactly, and is not justified in assuming his unit load either too light or too heavy. A difference in assumption of ten pounds per foot would make a difference of thousands of dollars in the cost of the completed building. It becomes then a very serious question as to what are the actual loads existing in such structures. By actual loads is not meant the theoretical loads nor the amount which might aggregate under impossible conditions but the maximum loads which are found

to exist in actual buildings, as a matter of absolute weight rather than theoretical assumption. As far as the writer is able to ascertain, there are very few recorded investigations of this kind. A recent appeal from the decision of the Inspector of Buildings in the City of Boston, regarding the loads in a building about to be erected, led to a very careful study of some of the most prominent buildings, the investigation being carried on by the writer in conjunction with Mr. Arthur G. Everett, architect, of the Board of Appeals, and the results of these investigations are believed to be of sufficient general interest to warrant a detailed publication thereof.

The process of investigation was as follows:

The Rogers Building, on Washington Street, near Court, the Ames Building, corner of Court and Washington Streets, and the Adams Building, No. 23 Court Street, were selected as types, being located in the centre of the city and being filled with a sufficient variety of tenants to insure a fair average which would be applicable to similar conditions elsewhere. The Rogers Building and the Adams Building are six-story structures, built with the ordinary masonry walls and wooden floor construction. The Ames Building is a twelve-story thoroughly fireproof building. The buildings were gone over very carefully, office by office, and copious notes taken of the dimensions of the rooms, the nature of occupancy and full details as to all of the contents; together with a statement of the number of people in the room at the time of measurement and the greatest number that had ever been known to be in the office at one time. The investigations were, of course, confined to the offices occupied, no account being taken of vacancies. Average weights were then assumed for the various articles entering into the live load. The weights of articles of furniture were averaged from the actual weights of various pieces. The weights of safes were taken according to the actual figures of the manufacturers. The averages are as follows:

ASSUMED AVERAGE WEIGHTS.

Persons	150 lbs.	
Books per running foot	10 "	including case.
Rolling top desks	250 "	
Flat top desks	125 "	
Tables	75 "	
Chairs	15 "	
Radiators per running foot	100 "	
Letter press	100 "	including case.
Toilet wardrobes	150 "	
Folding-screen	10 "	
Typewriter	25 "	
Glazed partitions per running foot	75 "	
Sofas	50 "	
Chests per foot in length	15 "	
Telephone stand	25 "	
Counters per foot	50 "	
Open rail per foot	3 "	
Steel box safes	2,500 "	

So many offices were measured that while portions of the contents might be heavier in some cases than in others, these figures would represent a fair average and would probably be in excess of rather than under the true weight. The same applies to the weight of persons: 150 pounds is probably more than the average of a miscellaneous crowd, including women and boys, but the average was counted at 150 throughout. In regard to the greatest number of persons at any one time in an office, the testimony of tenants had to be followed. It is probable, however, that it would be apt to be over rather than under estimated.

After the data from all the three buildings were entirely in shape they were carefully gone over by Mr. Everett and the writer, the assumed weights of the various contents carried out and summed up, and an average made of the weights per foot in the different offices as well as the weights per foot throughout the entire building. The results are widely different from what is given by some authorities as representing the loads on office floors. The average in some offices was as low as five pounds per foot. The highest load was in one of the offices of the Ames building, amounting to 40.2 pounds per foot. In only 12.4 per cent of the offices was the floor-load in excess of 25 pounds per foot, while in only 26 per cent did it exceed 20 pounds.

The following table presents a tabulated statement of the results. The maximum loads and averages refer to the offices filled with the greatest number of people ever known to be present at one time. The minimum loads refer to the same offices in the condition under which they were measured. The table of "average weights per foot in each office," gives the combined average of the averages of the individual offices.

Building.	Number of offices.	Total areas.	Average area per office.	Total weight.	Maximum.		Average of weights per foot in each office.	Minimum.	
					Average per office.	Average per foot.		Total weight.	Average per foot.
Rogers Building.	41	18,127 sq. ft.	442 sq. ft.	294,984 lbs.	7,194.8 lbs.	16.3 lbs.	16.8 lbs.	249,234 lbs.	13.7 lbs.
Ames Building.	70	32,151 " "	459.3 " "	544,419 "	7,777.4 "	17.0 "	15.6 "	455,618 "	14.2 "
Adams Building.	99	26,183 " "	264.5 " "	425,109 "	4.294.0 "	16.2 "	16.7 "	310,509 "	11.9 "
Total	210	76,461 " "	388.6 " "	1,264,512 "	6,021.4 "	16.5 "	16.4 "	1,015,361 "	13.3 "

In relation to the average load per foot, the number of offices loaded above that average, are in

Rogers Building	17 or 41.5 per cent.
Ames "	24 " 34.3 " "
Adams "	47 " 46.4 " "
Total	88 " 41 9 " "

The ten heaviest offices are as follows:

Rogers Building.	Ames Building.	Adams Building.
31.7	40.2	33.0
28.8	34.0	30.3
27.3	33.1	30.3
27.2	30 0	29.4
27.2	30.0	28.3
25.5	30.0	28.0
23.6	28.8	27.8
22.9	26.0	27.8
22.6	23.7	27.7
22.2	22.0	27.1
Average 25.9	Average 29.8	Average 29.0
Combined average, 28.2.		

Or, if a selection from all three buildings were made of the ten heaviest offices, the average load per foot would be 33.3 pounds.

The tenants of the 210 offices measured were as follows:

Lawyers	111
Real Estate	31
Stenographers	7
Architects	7
Manufacturing Companies	15
Railroads	10
Brokers	5
Insurance	3
Banks	3
Miscellaneous	18
	210

It was found that lawyers' offices, besides being the most numerous were also the most heavily loaded on account of the number of safes and quantities of books which nearly every lawyer requires.

These investigations were made without any preconceived data or any attempt to prove any particular position, and as far as such a thing is possible they represent the exact loads which exist in office-buildings of this character. Hence it follows, if these figures are to be trusted in any extent whatever, that even under the most extreme circumstances, taking the pick of the heaviest offices in the city and combining them into one tier of ten stories, the average load per foot would be only a trifle over 33 pounds, while for all purposes of strength an assumption of 20 pounds per foot would be amply sufficient in determining the loads on the foundations as well as the loads on the columns of the lower stories. The floor-beams themselves ought, of course, to be sufficiently strong to withstand the maximum, rather than the average load, and the vertical supports would have to be figured for higher averages of load in proportion as they are nearer the top of the building.

It may be of interest to refer slightly to the common practice in computing the strains on the various members of a tall office-building, especially such as have been so common of late years throughout the West and which are becoming more numerous in the East, as better construction and more exact methods of calculation are followed. It is found that the practice among engineers and architects varies a great deal, but there is a commonly accepted feeling that while the floor-beams should be made of sufficient strength to a great deal more than take care of the actual or the theoretical loads which come upon them both in order to prevent undue vibration as well as to guard against deflection of the ceiling, it by no means follows that the columns and vertical supporting members should be estimated upon the basis of the same load per foot that is assumed for the floor-beams. It is manifest that while certain portions of a floor might be loaded to a very high degree either by safes or by a sudden aggregation of people, it is extremely improbable, not to say impossible, that the entire area of an office should be loaded to any very extensive degree, and still less possible that all of the offices, one above the other, should be so loaded; and the investigations in the Adams, Ames and the Rogers buildings abundantly demonstrate the slight amount of load which actually obtains. Consequently, for a number of years the practice among the best architectural engineers has been to assume a much less load per foot for floors in estimating the loads upon the columns and vertical supports than they assume for the floor-beams. One of the most distinguished Chicago architects, who stands at the head of his profession, states that in calculating the floor-beams he assumes a live load of fifty-five pounds per foot, whereas, in figuring the columns only forty-five pounds per foot is assumed. W. L. B. Jenney, in a paper read before the American Institute of Architects two years ago, stated that the column loads in the Fair Building at Chicago were figured for a percentage of live loads such as would probably obtain, the percentage being estimated on a graduating scale which approximates, for the upper stories, an average of about fifty-three pounds per foot. A tabulation of the scalings is as follows:[1]

[1] From the proceedings of the twenty-fifth annual convention of the American Institute of Architects, 1891.

Column.	Live loads which the beams in the story above the respective column are calculated to carry.	Percentage of the sum of the live loads of all the stories above the respective column. This percentage of live loads, together with all the dead load, is the total load the respective column is calculated to carry.
Attic column.....	40 lbs. per sq. foot......	100 per cent.
16 story column.........	75 " " " "	90 " "
15 " "	75 " " " "	87½ " "
14 " "	75 " " " "	77½ " "
13 " "	75 " " " "	75 " "
12 " "	75 " " " "	72½ " "
11 " "	75 " " " "	70 " "
10 " "	75 " " " "	67½ " "
9 " "	75 " " " "	65 " "
8 " "	75 " " " "	62½ " "
7 " "	75 " " " "	60 " "
6 " "	75 " " " "	57½ " "
5 " "	130 " " " "	55 " "
4 " "	200 " " " "	52½ " "
3 " "	130 " " " "	50 " "
2 " "	130 " " " "	47½ " "
1 " "	130 " " " "	45 " "
Basement column.......	130 " " " "	42½ " "

In the Venetian Building, Chicago, the dead weight on the office-floors is 100 pounds per foot; the live load on the floors above the fourth is taken at 35 pounds per square foot. On the second, third and fourth floors it is taken at 60 pounds and on the first floor at 80 pounds. The whole of the dead load and about half of the live load is carried on the columns,[1] or in other words the column loads in upper stories are scaled down to 17.5 pounds per foot.

A similar method is followed by several other of the leading Chicago architects, as well as by architects quite generally elsewhere. Indeed, so far as can be ascertained the general practice everywhere, unless impeded by municipal regulations, has come to be that the column loads can safely be scaled down considerably from that which is considered necessary for the floor-beams. In calculating of the framing of a large fireproof building about to be erected in Detroit, the office floor-beams were figured at 50 pounds per foot of floor, with a reduction of 20 per cent for the loads on the girders and of 30 per cent for the loads on the columns. This would bring the column loads to an average of 35 pounds per foot. In Boston the revised building-laws require provision for live loads of 100 pounds per foot, and the Board of Appeals has refused to permit any scaling-down of column loads. The Ames and the Exchange Buildings were completed before the new law went into effect. In computing the former the live floor loads were assumed at 150 pounds per foot, which were carried to the columns without scaling down, although in the determination of the sizes for foundations the live load of the floors was assumed at only ten pounds per foot. In the Exchange Building the floors were figured for 150 pounds live load per foot, which was scaled down to 50 pounds per foot for the columns. In New York the building law requires the floors to be of sufficient strength to sustain 100 pounds live load per foot, and does not permit any scaling down of the column loads, but this law has apparently not been rigidly enforced in practice. The Havemeyer Building is designed for live loads of 100 pounds per square foot.[2] In the Jackson Building the live load was assumed at 50 pounds per foot.[3]

The actual average live loads on the floors of the three Boston buildings which were especially investigated are, as has been shown, from 13.3 to 16.5 pounds per square foot. The theoretical loads which are assumed for purposes of calculation in the other buildings referred to range from less than twenty to one hundred and fifty pounds, but a fair average representing the consensus of opinion among those who have had the largest experience in building the very tall structures seems to be to assume 40 to 50 pounds per foot for live loads on floor-beams, scaling down to 35 to 45 pounds for girders and 30 to 40 pounds for columns. C. H. BLACKALL.

M. CHEDANNE AND THE PANTHEON AT ROME.

YOUR readers have heard of the *Prix de Rome*, an institution founded by Colbert, which at the close of competitive examinations every year sends to Rome one young artist in each specialty. The young men remain for five years. Formerly the rules required them not to leave Italy, but now they are permitted to run through Greece, Egypt and other countries. It is our Institute, the Academy of Fine Arts, which conducts the examinations for the Roman prize, and which looks after the delivery of the pensions paid to the artists during their stay in Rome. They are called the "pensioners of the Academy of France." In Rome they stay at the Villa Medici, a piece of property belonging to the Institute. They are obliged to send to Paris annually the works completed by them during the year, which are submitted to the Academy and exhibited. The musicians also send their compositions, which are played before the Institute in solemn session, and Paris high life scrambles for the tickets of admission. The architects, painters, sculptors and engravers exhibit their works at the School of Fine Arts. They are generally, for the last three categories, copies of Italian masterpieces. Inspirations from antiquity, works in which originality is wanting, have something about them belonging to the good pupil desiring to please his masters and possessing a disagreeable *arrière-goût* of the *pensum*. The architects profit but little from the permission to travel, which was accorded to them quite recently, after a lively campaign on the part of the press. They generally confine themselves to restorations indefinitely repeated. It is rare that in the exposition of the exhibits from Rome the Tomb of the Scipios or the Theatre of Marcellus is not to be found. From the time when our young pupils of the School of Rome restored, always in the same fashion, the Temples of Concord, of Hercules at Cori and of Vesta at Tivoli, these monuments might be definitely consolidated even by doing nothing more than pasting over them Whatman paper, which has so often been used in the innocent exercises of our architects.

The Roman exhibits, therefore, especially in architecture, were generally uninteresting reconstitutions, only presentable through the marvellous virtuosity of their execution; and the public had almost completely forgotten the road to their exposition hall. But this year all those who are interested in questions of art have gone to see the exhibits from Rome, because it was said that an original work upon the Pantheon was shown. The specialists knew that the sojourn at Rome of M. Chedanne, the young architect who is the author of the work in question, had been prolonged by two years by a special order of the Minister of Public Instruction and Fine Arts in order to enable him to finish the brilliant discoveries that he had made.

It was not a preconceived plan; it was the investigation made in the course of a study undertaken to verify certain assertions of the archæologists which brought M. Chedanne to the discoveries that he has made.

In the first place the young architect proposed simply to study the structure of the great dome of the Pantheon, doubly interesting by its antiquity and its prodigious dimensions. Having obtained the permission of the Italian Government to take out a few bricks in order to study the system of arcuation which lightened this dome, he perceived that the bricks employed in the construction were all marked with the seal of the potter and bore dates varying from 118 to 123 A. D., which was a complete disproof of the hypothesis admitted up to the present, that the Pantheon such as we see it to-day, was built by Agrippa. It is known that in support of this proposition the archæologists rely upon a description by Pliny. Now, inasmuch as Pliny died in 79 A. D., this description, which has been so often cited, could be only that of a building anterior to the one which we see to-day.

Continuing his investigations, M. Chedanne opened the flagging that forms the floor of the Pantheon, and found at two metres below, another floor more ancient still. Investigations made in a sewer which passes near the foundations of the building enabled him to discover a wall very much lower down than the steps of the present peristyle. This wall, on account of its extremely careful dressing, seemed to him to belong to the time of Augustus. Further investigation showed that it was covered in places with a marble casing separated from the stone wall by a *chemise de meulière*.

The young artist was particularly struck by the strange proportions of the columns of the peristyle, eight in number, as you know. After careful study and comparisons, he became convinced that these proportions would not be extraordinary if, instead of eight columns, the peristyle was composed of ten. With this view he made further searches, and discovered the sub-bases of the two missing columns.

Certain joinings, and especially those of the corner capitals also puzzled him by their clumsiness, contrasting strangely with the fineness of the sculpture. Did they use in the construction of the Pantheon which we see to-day the material that belonged to the old Pantheon, whose foundations and floor M. Chedanne has just discovered? A new observation comes to the support of the affirmative. A striking contrast exists between the inclines of the modillions of the fronton in the preserved antique portion and of those that had been introduced in the course of its reconstruction. The former were slightly inclined from the vertical, the others were exactly vertical. M. Chedanne conceived the idea of reconstituting the fronton with ten columns, such as it must have been, he considered, in the ancient Pantheon. Now, by giving the tympanum the same height, the angle which forms the incline between the *fronton* thus reconstructed and the existing *fronton* becomes precisely the angle formed by the modillions with the vertical. M. Chedanne concluded that the present peristyle was constructed with the materials of the old one.

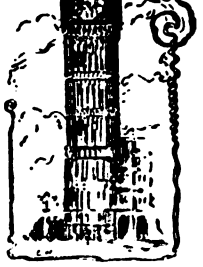
Along with these observations M. Chedanne made some interesting discoveries in the construction of the dome itself. The excavations which he had made to bring to light the flagging of the ancient building, enabled him to discover a sewer in the very centre of the Pantheon, designed, as he thinks, to receive the rain that came in through the circular opening at the top of the dome. It will be remembered that some archæologists, not knowing how this drainage could be effected, put forth the idea that the Pantheon was covered by a lantern.

This is only a very general sketch of the important study of M. Chedanne, a study which is the result of two years' investigation upon the spot, and which is represented at the School of Fine Arts by about thirty sketches (*châssis*). The exhibit of M. Chedanne is certainly the most remarkable that has appeared in many years among the exhibits from Rome. It places him at the top of the wheel, and

[1] Birkmire, "*Skeleton Construction in Buildings*," page 65.
[2] Birkmire, page 1[illegible]2.
[3] Birkmire, page 154.

classes him among the most distinguished of our archæological architects. Let us add that this work is enhanced by qualities of drawing and painting which are truly remarkable. Among others, one great water-color, giving the present state of the whole of the Pantheon, is certainly the work of a first-class water-colorist.

The Italian Government, grateful for his services, has conferred the grade of Knight of the Order of the Crown of Italy upon the pensioner of the Academy of France. Generally speaking, we are slow to recognize the merit of our citizens who possess talent without the spirit of intrigue; but nevertheless, in our "well-informed circles" it is said that M. Chedanne will be made a Knight of the Legion of Honor at the next promotion. — *Raymond Daly in the New York Sun.*



THE MODERN ENGLISH MECHANIC. — BUILDERS' EXHIBITION AT ISLINGTON — PLUMBERS' WORK ALONE CREDITABLE. — ACTION OF THE CITY COMPANIES AS REGARDS THEIR RESPECTIVE TRADES. — THE NEW TECHNICAL EDUCATION BOARD FOR LONDON. — MOVEMENT FOR A MUNICIPAL BUILDING DEFEATED.

THE inefficiency of the average modern workman has now almost become a byeword among architects in England and various proposals have been made for infusing a little more enthusiasm among mechanics but so far with little success. The decline is attributable to many causes, the most important perhaps being the development of machinery and the consequent over-specialization of the men. Take for instance, the average joiner. His progress in his pupil days is almost entirely dependent on the goodwill of the shop-foreman. A man in this capacity who has earned for himself a good position was talking to me the other day and stated that it was quite a privilege for him to let a youngster have a few months in the setting-out shop. The average joiner gets his work not only all set out by others, but the work is planed, rebated, moulded and morticed away from him by machinery, and he develops into a sort of human machine for putting the work together. This state of affairs evidently has a powerful influence in stifling individualism and perhaps another may be found in the trades-unions systems which permeate all the labor industries of this and most other countries. A bricklayer is, for example, fixed by arbitration to be worth a certain sum per hour and it matters not whether he is a good or bad workman nor whether he is fast or slow, he still obtains the same wage. Consequently, is it in human nature to attempt to do more either as to quality or quantity than the minimum allowed by the contractor or architect, as the case may be?

This then being the state of affairs it is pleasant to be able to record some attempts to raise the standard of workmanship, and it is the more welcome when the efforts are made by the men themselves. This is the case as regards the National Workmen's Exhibition now being held at Islington. It is an exhibition promoted by the London Trades-Unions ostensibly for the object of promoting friendly rivalry among the men and stimulating a desire to produce work of good quality and artistic character. I wish I were able to chronicle that the objects of the exhibition have been borne out in the results, but I am sorry to have to record that except in one trade, the plumbers, matters are at about as low an ebb as they can well be. The chief efforts of the bricklayers, for example, have been devoted to the execution of a doorway in carved brickwork, where the brick has been treated as if it were cheese and cut and worked about without any regard to the solid character of the material. No doubt part of this is due to the wretched character of the design, but it is pitiful to see men who really show interest in their work misled in this way. They have evidently wandered on either without instruction at all or with poor instruction, with the result that the labor might almost as well never have been expended. The same remarks almost apply to the joiners. Perhaps it is considered *infra dig* to exhibit a really well-made piece of framing, but at all events there is nothing of this kind to be seen. What we do see are a few examples of eccentric work and marvellous carving of one or two designs, by young joiners, of gates, etc., which are as unscientific as they are inartistic and which have evidently been made without the most elementary competent instruction. This sort of thing runs throughout the entire section of the exhibition which relates to builders' work with the exception of the plumbers who really make a creditable show. The excellence of the leadwork is perhaps as noticeable as the poverty of the productions of the other trades, and augurs well for the future of their trade. The competition is brisk, in itself a healthy sign, and the standard is high, more particularly in the practical plumbing. Perhaps in the ornamental lead rain-water heads the design could be improved, but even here there is much to be admired. I am glad to be able to say this of the plumbers' trade as it is an excellent testimony of the excellent work being performed by the Plumbers' Company. This is one of the rich City Guilds that were founded in the Middle Ages for watching over the interests of the various trades. Many of these Guilds at the present day have altogether passed out of touch with the trades they nominally represent and excite considerable criticism from the public by the manner in which they discharge their duties.

The Plumbers' Company, however, is one of a small band which really does exert itself, and it has taken the lead by instituting examinations in theoretical and practical plumbing and lead-work. Young plumbers who pass this examination are entitled to style themselves "Registered Plumbers," and the action of this Company is becoming so noised about that plumbers who are not registered are finding increasing difficulty in obtaining good employment. It is evidently this admirable work of organization and education which has borne such good fruit and has enabled this trade to set so good an example to its fellows at Islington. I am glad to see the Carpenters' Company, which has also done good work in the past, has founded an "Institute of Certificated Carpenters," which, however, does not seem to be in a wonderfully flourishing state. They had a dinner the other day and the chairman of the meeting pointed out very rightly that "there was a growing feeling that the method of work of the past fifty years, namely the production of articles on which were expended the least amount of time and trouble was departing, and that the new creed would be that every man would throw into his work earnestness, and endeavor to produce the best work for the love of the work itself, and thus rival the splendid work the carpenters and joiners of the Middle Ages produced, and raise the trade to a higher and nobler standard." This is excellent talk, but it would have been better for the Carpenters' Company had the trade made a better show at the exhibition.

Another influence which may lead to the improvement of the various trades and handicrafts is the organization of the new Technical Education Board for London. Powers to assist technical education and the means wherewithal to afford such assistance were granted to the County Council by the late Government, but it is only lately that the Council have taken any very decisive steps. Mr. Llewellyn Smith, M. A., on behalf of an Inquiry Committee drew up a very able and exhaustive report upon the present state of secondary and technical education in London, and a very remarkable document it is. It has been obvious to us all for some time past that the organization of this most important form of education was much behindhand, but I do not think that the utterly chaotic state of technical education in our metropolis can be realized by any one who has not studied this report of Mr. Smith's. The old apprenticeship system is fast dying out, if not already dead, and there is nothing at present to take its place beyond the few polytechnics which are springing up to meet a want which had to be satisfied. Trade education for the most part is one gigantic system of "picking up" and is it any wonder that our workmanship is falling from its high standard and becoming degenerate. It is to be hoped that this new Board will justify its existence, but it is a matter of keen regret that it has been constituted without any architect or representative from a recognized architectural society among its members.

The proposal to erect a fine Municipal Palace, for London, on the Westminster site that I described last month, has been rejected by the interposition of a Cabinet Minister. Lord Rosebery came down to the Council and spoke strongly against any such proposal, and his influence is so great that he entirely carried the day. The present chairman is, however, not of the same view, and in his annual address referred to the inconvenience felt by the central staff being distributed over various houses in different parts of Charing Cross and stated that many of the Council's offices are located in rooms totally unfit for use, and with not much more air-space than would, by law, be required in a common lodging-house. Indeed he went so far as to say that he hoped that only those who took his view would be returned again to the Council.

PARIS AFTER THE RIOTS.

NOW that the riots of students *versus* policemen are over, says "S. D." in the *New York Evening Post*, it is worth while counting up the cost to Paris and the Republic at large. But first it is necessary to rectify certain telegraphic appreciations. It was natural that Germans, in presence of their Military Bill, should exaggerate the importance of the troubles in the French capital; but it is hard to understand why the English sources of information should have been so untrustworthy.

To go back to the beginning, the Bal des Quat'z-Arts, which was made an occasion for putting in force the Bérenger law against public licentiousness, was in reality not a public ball. It was what it purported to be — the annual ball given by students, chiefly of the art schools, with the help of artists' models. It is certain that the ball was not open to loose women; and it was next to impossible for any man who was not a student, a journalist, or a magistrate to get admission. That nearly 3,000 persons were present is not surprising in a student world of over 10,000 souls.

For the rest, the greatest attention was paid to decorative costuming, or lack of costume, as known in French art. The principal

figure of the Grand March was Rochegrosse's model for his "Fall of Babylon," clad in the costume in which she had posed to the painter. Considerable pains was also taken with the character of the dances; and an American painter won great success by doing the "Hoola-Hoola" as a Sandwich Islander.

It is evident that sedate people, who have no acquaintance with student life, and who would be horrified at the life-classes of the most correct studio, would find all this Ninevitish to a degree. But this is no reason why an exclusively students' ball, dissolute as it may have been, should be judged in the same way as the great commercial speculations in licentiousness which abound in Paris. One of the policemen who were present to keep order testified in court that the Quat'z-Arts was modesty itself compared with the scenes enacted each year at the masquerade-balls of the Grand Opéra. Yet these are never molested, perhaps because they are under protection from high quarters and are organized for the benefit of retired army officers. Now these Opéra balls are really public, being open to any one who has money to buy an admission-ticket.

Every one who knows Paris cannot help sympathizing with the resentment of students thus unfairly made the scapegoat of public order. It is difficult to imagine where the foreign correspondents who take sides against them have been living.

The League of Order, however, after the ball was all but forgotten, persisted in bringing its organizers before the courts. Shakspeare's "Measure for Measure" might have warned them of the limits of what is practicable in such a case. The judges evidently took the poet's view, and inflicted only light fines on a single art-student, who had been the most prominent in the affair, and on three or four of the women (of whom two were not models, but had obtained entrance without the knowledge of the committee). Then they applied the law of first offences to all the accused parties.

Curiously enough, this law, by which the judge, at his discretion, may remit the punishment of a first offence, is due to the same M. Bérenger who had taken the lead in the prosecution. But this seething the kid in its mother's milk on the part of the judges was not enough to disarm the wrath of students who are always ready to get up "manifestations" for the simple sake of manifesting. Their last riot was in 1882, when they mobbed the police of the quarter because the latter would not keep loose characters away from their Bal Bullier. M. Goblet, the present leader of the Radical-Socialist coalition, was then minister; and his police treated the students badly enough.

All this was now forgotten and a giant "*monôme*" (a students' reminiscence of algebra) was organized. It ought to have been as harmless as any students' procession can be, marching noisily through the streets, but with no special element of disorder. On the first night the police kept the students from getting in front of M. Bérenger's house, which is on the right side of the river; and they had not the satisfaction of making him hear in person their favorite cry of disapproval: "*Conspuez*" (Spit on him)!

The next day the demonstration naturally turned against the interference of the police, and a thousand or more students marched in the afternoon to the Palais Bourbon, the present House of Deputies. The grating across the yard in front had been closed to prevent their entrance. Everything, however, went on with the greatest good nature. Parley was made for the admission of a few delegates from the students; and a number of Deputies, catching the spirit of youth, ran out from their grave parliamentary labors to look from the porch at these future rulers of France. The students took up the game and began throwing pennies to the Deputies, shouting, "Budget! budget!" It was the time when the Parliament was lingering unduly in voting the Government appropriations for the coming year.

With the evening, crowds of idle spectators poured into the Latin Quarter to see what the students were about. No one had the slightest suspicion of trouble brewing. It was then that a vital blunder was made by the police authorities. It was resolved, possibly out of personal pique, to put down these students' demonstrations at any cost; and extra brigades of policemen, unacquainted with students' ways, were imported into the quarter. It is exasperating that some of the principal English papers should announce that the serious trouble which followed came from the students' resistance to policemen attempting to collect fines imposed for the Bal des Quat'z-Arts. The police simply charged a peaceful crowd, wherever the students provoked them by their outcries.

The Brasserie d'Harcourt, which is the most popular resort of students on their Boulevard Saint-Michel, or Boul' Mich', as they call it, was sure to have its terraces cleared. Here, by some great misfortune — no one probably will ever know how — a young man, who was not a student at all, and who was seated inside the café, was killed by a heavy match-holder thrown from without. It is not even quite certain that a policeman threw it. But it was sufficient to transform the harmless *monôme* into the bloody riots of the succeeding days.

The remainder of the story has been accurately enough reported. The police quite lost their heads, their chiefs held out obstinately in the mistaken policy first adopted, and the criminal element came in from the outskirts to break and burn and do as much damage as possible. Meanwhile the students, who, it must be remembered, are the sons of the best families of France and the only hope of the Republic, little by little withdrew.

A new element of contention was now introduced. The Ministry' which depends for its existence on keeping its majority in the House of Deputies, had just been openly defied by the Labor Exchange [Bourse du Commerce]. A large number of the trade-unions gathered there openly refused to comply with the law governing such organizations. The delay granted them for the purpose was at an end; and the Government was placed in the alternative of closing the Exchange or yielding once for all to the demands of the Socialist party. In their uncertainty as to what Prime Minister Dupuy might do, the Socialist leaders had installed themselves in permanent committee in the Latin Quarter, perhaps on the principle that one bad cause might help another.

Suddenly, one night, some 20,000 soldiers were ordered into Paris. The next day, to the surprise of every one, the Labor Exchange was closed by armed force. This at once removed the centre of storm and stress from the students of the left bank to the workingmen of the right. In point of fact, the trouble was already over. The police may not be liked, but even the workingmen love as well as respect the army. The issue now became political.

By his show of firmness in closing the Labor Exchange, M. Dupuy for the first time secured the support of the Conservative Deputies. Now, for a full dozen years, Ministries in France have stood, when they succeeded in standing at all, only by a coalition with the Radicals. The Radicals, who have lately made a fast and firm alliance with the Socialists, were not slow in taking action. M. Peytral, a Radical who is in the present strangely mixed Cabinet, sent in his resignation. M. Dupuy, like every other Prime Minister of late is a rank Opportunist; he accordingly at once set about changing his coat. For that matter, he is right in judging that no conservative element in the French Parliament of the present can ever keep a ministry in power. The old Republican concentration with the Radicals is a necessity, and to the Radicals some sacrifice had to be made.

This was not difficult; he simply procured the removal of the Prefect of Police, who was equally obnoxious to students and Socialists. The Radical Minister retains his place, the Socialists can look forward with renewed hopes to the coming general elections; and the excitement of the students' riots has been made to cover a clever political manœuvre.

All this shows what has already been written in these letters, that the continuance in power of the present so-called Republican party in France depends on the new and amazingly strong Radical-Socialist coalition. In all the late events, students and policemen have been but incidents by the way. In France it is Socialism that profits by every tumult and revolution.

The cost to the French republic of all these riots is loss of reputation abroad and a feeling of insecurity at home. In Paris itself, outside of the Latin Quarter on the left bank of the Seine and a small portion of the city on the right, there was at no time the slightest disturbance in the city's business or pleasure. Only those who went to search for the signs of revolution could find them. But the knowledge of the facts, with the sudden political trend they have taken, has increased the general impression already felt by the French people that they have not a government able to cope with the elements of disorder in the nation.

Coming after the strikes of Carmaux and the Panama trials, this may not imperil the Republican form of government in France, but it will push Republicanism farther and farther towards State socialism. To avoid this, it will be necessary to form a coalition of all the conservative elements with the moderate Republicans; and this would further require that satisfaction should be given to the religious people for the military and school laws which weigh on them so heavily. But M. Constans himself, who is trying to pose as the leader of such a coalition, is unwilling to make concessions on this ground.

Thus, after more than twenty years' experience, France is still working over the formulas of the two chief founders of her third republic: Thiers, "The Republic will be Conservative or it will not be"; Gambetta, "Clericalism — that is the enemy." Meanwhile, Socialism comes bravely forward in spite of, perhaps because of, a fact loudly proclaimed yesterday by one of its leaders: "Every government is against us, monarchy, empire and republic."

The loss in money to the city of Paris from the late disturbances will hardly be overestimated. The well-known restaurateur, Marguery, who is syndic of the "*limonadiers*"— the quaint name adopted by the union of café and restaurant proprietors — declares that their branch of industry alone has already lost from six to seven millions of francs. He adds that, if the recommendations of the Socialist Municipal Council against celebrating the national fête of to-day (the 14th of July) are followed out, he and his associates are bound to suffer a loss of as many millions more.

But let no stranger imagine that this anniversary of the storming of the Bastille is likely to pass unobserved, or that French thrift will take alarm at Socialism of this Municipal Council kind. One of the most interesting as well as most difficult problems in the political evolution of France is the present steady advance of Socialistic ideas, under circumstances apparently so unfavorable, among all classes of society. The ultra-Catholic Comte de Mun has made himself welcome even to the irreligious workingmen by advocating a veritable Socialism, in which the State, on Christian principles, should regulate capital to the advantage of labor. It is true he

would not do away with the right of private property but in this he agrees with the more eminent leaders of present Socialism.

It remains to be seen whether the tide of universal suffrage in other countries, as well as in France and Germany, will tend to make Socialism the goal of modern democracy.

THE FORMER GIANTS OF YUCATAN.

PHENOMENALLY big men and women have occasionally appeared in various parts of the earth, and several nations possess traditions of gigantic people having at one time inhabited their lands. Even the Bible tells us something about giants. But skulls of unusual size as well as other bones were really dug up at Pitcairn Island by officers of the expedition under Captain Beechy, in the early part of this century. The French traveller and writer Jean de Despriaux, when residing in the Canary Islands, was much pleased at procuring some mummies of the big Guanches, a man and two women, preserved as the Egyptians used to preserve their dead. "The man was of gigantic stature," he says, "which is in perfect conformity with all tradition relating to the ancient Atlanteans. The women had long black hair, plaited with straps of leather painted red or green. Their dress was plaited in front; their breast covered with a kind of short zarape." The straps of their sandals were painted red and ornamented with small pieces of obsidian beautifully wrought. The dress of the man consisted of a tunic and a mantle, tied up on the chest in a knot. M. Despriaux was delighted later on to find that in the high Andes of Peru the women were attired just as his mummies had been, and that their headgear and mode of dressing the hair were identical.

The American continent seems to have been the place where big men abounded, for here are found many remains of human beings much larger than any of its present inhabitants. At Chancai, thirty miles north of Lima (Peru), very large human skulls were dug up only a few years ago by Dr. Le Plongeon. Others have been unearthed on the Island of Puna, in the Gulf of Guayaquil, at the entrance of the Guayaquil River. A Jesuit father named Anilo Oliva wrote an ancient history of Peru, dictated by an old archive-keeper, Quippu Camayoc, a Peruvian. Oliva's work exists only in manuscript, and is in the British Museum, London; but the writer has a copy of it. Oliva says that Puna, as well as the opposite coast, was formerly peopled by giants who had come from Central America. In the work of Zarate we read that they were as bad as they were big, so that they became a terror to all the other inhabitants. Those tall fellows had their strongholds particularly at the Island Puna and at Point Santa Elena, Guayaquil. Some of their works can yet be seen in those places in the shape of immense stone and adobe walls and more especially in the great wells which they dug to supply themselves with water. The career of those bad big people was probably brought to a close by some electrical phenomena, for tradition says that the gods destroyed them with fire from heaven.

In the north part of Mexico a few years ago human remains were unearthed from well-made stone tombs. The skeletons were nearly nine feet long. In Southern Mexico, the Yucatan peninsula seems to have been at one time quite a favorite residence of a race of people about nine feet high. On our first visit to that country, before we had been twelve hours on shore, the inhabitants of Progreso mentioned to us that giants had once lived there. Don Fermin Domingo, one of the first settlers in that town, respected and trustworthy, accompanied us to an ancient cemetery whence he had procured stones to fence-in his property and build his house. He pointed out vestiges of a mound which on its west side had had stone steps leading to the summit. At the foot of them, on each side were four sepulchres in a line, partly underground. They consisted of two hard limestone urns about three feet square, placed mouth to mouth and joined with cement. The lower one had a hole in the bottom for the escape of gases generated by decomposition. Nothing, not even dust, remained in them, which would show that those stone coffins were very ancient. To the student their discovery is deeply interesting, for the reason that they were exactly like some found at Mughier, in the lower plains of Chaldea, the only difference being that at Mughier the coffins were made of clay instead of stone. By the position of those at Progreso we infer that the bodies were interred in a squatting posture, which was customary in many parts of America. If they were placed thus, and yet needed a height of six feet, they were certainly very big bodies. In various parts of the same cemetery Don Fermin and others dug up a considerable number of terra-cotta jars, containing skulls which the old gentleman assured us were twice as big as his own head. We regretted that he had not felt sufficiently interested to keep at least one sample. We ourselves did a little delving, and found pieces of large bones, but they crumbled in our fingers.

While travelling in the interior of the country we were frequently told of places where giants' bones had been disinterred. The interesting ruins of Ake, twenty-seven miles east of Merida, might reasonably be regarded as the work of very big and uncouth people. Each step in one stairway is twenty inches high, by no means convenient for persons of ordinary stature. The stairway is 156 feet wide. In one part smaller stones have been added, making two steps out of each, a total of thirty-six instead of eighteen, as if people of medium size had lived there at the same time, or perhaps later, and arranged the extra stones for their own convenience. Round about the ancient structures not only large skulls have been dug from the ground, but also tibia and other bones, all exceedingly large. From the time of the Spanish conquest such remains have now and then been brought to light in the Peninsula. Father Cogolludo and Diego de Landa, second Bishop of Yucatan, wrote works about that country and its people and both testify to the discovery of gigantic human bones. Cogolludo, whose work is the most complete, says that in 1547 on the high road of Campeche a large sepulchre was opened. It was formed of stone slabs placed one above the other, and therein were "human remains of a formidable size." With these they also found three large boxes of terra-cotta supported on three hollow balls that served as feet. There was also an urn of black stone "like jasper." The natives were ordered to break the bones to fragments, but they refused to lay a finger on anything in the grave, declaring that it was forbidden them to meddle with such things; and so the friar, Juan de Carrion, himself destroyed the remains.

One of the superstitions now existing among the natives would seem to be a reminiscence of the big people that formerly dwelt in Yucatan. Uauapach is a phantom giant supposed to haunt the highways at night to intercept belated pedestrians and trip them up by standing astride, stretching out his feet from one side of the road to the other. — *Alice D. Le Plongeon in the N. Y. Tribune.*

ILLUSTRATIONS

[*Contributors are requested to send with their drawings, plans and a full and adequate description of the buildings, including a statement of cost.*]

HOUSE AT DETROIT, MICH. MESSRS. ROGERS & MAC FARLANE, ARCHITECTS, DETROIT, MICH.

[Gelatine Print, issued with the International and Imperial Editions only.]

HOUSE OF J. W. HENNING, ESQ., 50 WEST 52D ST., NEW YORK, N. Y. MR. JAMES BROWN LORD, ARCHITECT, NEW YORK, N. Y.

DETAILS OF THE SAME.

COMPETITIVE DESIGN FOR ST. LUKE'S HOSPITAL, NEW YORK, N. Y., SUBMITTED BY MR. JAMES BROWN LORD, ARCHITECT, NEW YORK, N. Y.

[Additional Illustrations in the International Edition.]

DOORWAY TO A HOUSE AT DETROIT, MICH. MESSRS. ROGERS & MAC FARLANE, ARCHITECTS, DETROIT, MICH.

[Gelatine Print.]

HATFIELD HOUSE BANQUETING HALL. DRAWN BY HERBERT RAILTON.

ONE of the attractions of the Chicago Exposition is a reproduction in facsimile of the fine old Banqueting Hall of Hatfield House, which, by the permission of Lord Salisbury, Messrs. Hampton & Sons have been enabled to make. The reproduction is only forty feet in length, whereas the original is fifty-five feet long, but this size has enabled Messrs. Hampton to give a fine reproduction of the spirit and character of this charming old hall. The carved work has all been done with the utmost care, casts having been first taken of the various faces so that the resemblance might not be lost. The oak has been fumed to give it the real shade of dark brown which comes of old age. No attempt has been made to copy the present furnishing of Hatfield House, but the Marble Hall forms a splendid setting for the fine examples of cabinet work which constitute with it Messrs. Hampton's exhibit at Chicago. The fine Minstrel's gallery at one end of the hall and the celebrated screen at the other have been reproduced with remarkable fidelity, and especial care has been taken to give effect to the softly-faded heraldic coloring on the walls. The floor is, as at Hatfield, in squares of black and white marble. Few examples of English architecture could surpass Hatfield in historic interest, dating as the site of a house from the Haethfeld of Saxon time (from its situation on a heath), having been a bishop's palace in the time of Henry I, the residence of the youthful Edward VI and of Queen Elizabeth, and at last in the reign of James I, being exchanged by that monarch for Theobalds, the property of Robert Cecil. Messrs. Hampton have, therefore, chosen as an exhibit a subject which should have much attraction both for English and American visitors. This plate is copied from the *British Architect.*

"NELSON ROOM" IN THE STAR HOTEL, GREAT YARMOUTH, ENG.

EAST ANGLIA, chiefly rich architectually for ornamental flint work, and for the elaborate Gothic woodwork in the furnishing of

its churches, has also some remarkable examples of Jacobean plaster-work and Renaissance wainscot fittings in domestic buildings. Foremost among these for ornateness is the celebrated "Nelson room" in the "Star Hotel," Great Yarmouth, of which we give the accompanying pencil-drawing. This apartment is on the first floor of the house, and is entirely surrounded by an almost black wainscot panelled lining, divided by pilasters into regular bays, and elaborated with alternating female and male figures between the carved panels of the arcaded stage, some five feet from the floor. The lobby porch in the angle of the room forms part of the composition, and the fireplace is also treated as belonging to the design. The ceiling is divided into six compartments, with wide beams more or less depressed and irregular by shape and age, with fillings enriched by foliation, fruits and other devices. The building itself has a square-cut flint front, and was erected by William Crowe, a rich merchant, towards the close of the sixteenth century. The arms of the Company of Merchant Adventurers are carved over the chimney-piece. The portrait of Lord Nelson which hangs at the end of the room was painted by Keymer, when the great admiral visited Yarmouth, and from this circumstance the apartment obtained its name, the club of which the artist was a member having met here for the past hundred years. This plate is copied from *Building News.*

CAPITALS FROM THE ABBEY OF MOZAC, FRANCE.

THESE capitals are copied from *L'Art.*

TOMB AT BUDA PESTH, HUNGARY.

THIS plate is copied from *Architektonische Rundschau.*

THE PANTHEON, ROME, ITALY, AS RESTORED BY M. CHARLES CHIPIEZ, ARCHITECT.

THIS plate, copied from *La Semaine des Constructeurs,* does not indicate a restoration in accordance with the recent discoveries of M. Chedanne, mentioned elsewhere in this issue.

HOUSE IN QUEEN'S GATE, SOUTH KENSINGTON, LONDON, ENG. MR. R. A. BRIGGS, ARCHITECT.

THIS plate is copied from the *Builder.*

HEWELL GRANGE, BROMSGROVE, ENG.: STATE DINING-ROOM. MESSSS. BODLEY & GARNER, ARCHITECTS.

COTTAGES AT PORT SUNLIGHT, LIVERPOOL, ENG. MR. HUON A. MATEAR, ARCHITECT, LIVERPOOL, ENG.

THE works at Port Sunlight, on the Mersey, near Liverpool, having been completed, Messrs. Lever Brothers are now building cottages for the workmen. Several architects are engaged upon the work, consequently there is much variety among the designs. The walls are constructed of stone, and the chimneys of brick; all the external timbers are oak, and the roofs covered with Broseley tiles.

NUREMBERG, AFTER A DRAWING BY SAMUEL PROUT.

COMMUNICATIONS

[*The editors cannot pay attention to demands of correspondents who forget to give their names and addresses as guaranty of good faith; nor do they hold themselves responsible for opinions expressed by their correspondents.*]

A QUESTION OF COMMISSION FURTHER DISCUSSED.

NEW YORK, August 15, 1893.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,— I am sorry your reply to my question does not take what would seem to me a fairer view of the architect's rights.

An unremunerative contract is closed and ended. The owner comes to the architect for other added work, he takes time and expense that could be devoted to other work at full commission. Why should the architect suffer positive loss, neglect paying business for this owner for whom one good turn as per your verdict would seem to deserve another? Your point, failure to notify that rate must be advanced, is something I admit, but the law of contracts for added work, viz., "compensation at a reasonable and fair valuation," was all I ever wanted and notification of this seemed to me not at all necessary because universally known. Why should not an architect have as much justice as the builder (in contract service) for extra work?

If the builder loses $500 in fulfilling a bad contract, and there is an extra, must he lose an added pro-rata on that extra? To say yes, we answer at once, is absurd, yet practically your answer to my question was an exact parallel. If not, why not? Your answer seems to have left out of view the fact that just as with the building cost for material and labor the architect's work is costly. And I cannot see why in case he has made a bad contract he should not be entitled to the universally conceded law of contracts for extras, and because it is a well known law. Why should he not be entitled to it without the special notification of which your reply speaks which, as I said, seemed to me unnecessary and, therefore, omitted?

Yours truly, X.

N. B. Perhaps I ought to comment on the words, "We do not see how without such notice he could fairly be held to a change in the rate of compensation which had been agreed upon."

No *rate* had ever been agreed upon. There existed no understanding whatever except the one lump-sum contract for enlargement to working-drawings of accepted preliminaries, and there was a special proviso that the preliminaries fixed the character of the design. X.

["X" PUTS his point very well, but we can still see no reason for altering our opinion. In the case of a contractor for a building, it is very common to have it specified in the agreement that extra work shall be paid for at the same rate as similar work under the contract, sometimes adding a fixed percentage for the trouble of making the change, and, even where the agreement says nothing about how the proper price of extra work shall be ascertained, it is always assumed that it is to be a reasonable price, and a contractor would have great difficulty in collecting pay for extra work at double the rate that he estimated similar work to be worth under the contract, even though he lost money on the contract work. It must be remembered, moreover, that an architect has much less excuse for raising his price without notice than a builder would have. The latter must depend, in making his contracts, on estimates made on incomplete data, on the honesty of sub-contractors, on fluctuating prices of materials and various other uncertain quantities; but the architect has no such uncertainties to contend with in putting a price on his own work, and if he agrees to execute a certain commission for a client for a given remuneration, it still seems to us that the client is entitled to presume, unless notice to the contrary be given, that the architect will be satisfied with that rate of remuneration for anything that can be called a continuation of the original commission. Let "X" examine the converse of his claim. Suppose he had agreed with his client that he should receive the usual five per cent on the original commission, and after he had done the subsequent extra work, his client should tender him payment for it at the rate of two per cent, saying that although he had paid the first bill of five per cent, it was more than he could afford, and that he had lost money by doing so, because several other architects had offered to do the work for two per cent; and he could, therefore, only pay him for the extra work at the rate that he could get it done for by other parties. Would he have thought this fair? And, if his client had agreed with him, saying that he was out of pocket by keeping his agreement for five per cent on the original commission, and ought not to be expected to pay more than the market-price for the extra work, would not "X" have replied that his terms were fixed and agreed to at the outset, at five per cent on the cost of the work, and that these terms covered any extension of the original work, or even any new work for the same client, whether the client thought this was the market-price or not, until a change in them had been consented to by both parties? Of course he would, and he would have been right. In an important case in New York, where no agreement had been made between the architect and his client as to the fee to be paid for an important piece of work, the architect sent in a bill at the Institute rate. The client disputed it, saying that the service was not worth so much, but the architect proved that he had previously done work for the same client, and had charged the Institute rates, and his bill had been paid; and the Court held that these rates were implied as part of the contract for the subsequent building, and that evidence as to the actual value of the service rendered could not be admitted. If, therefore, the architect has the right to claim that the rate of payment once agreed upon between himself and his client governs, by implication, all subsequent transactions between them until some different bargain is made, has not the client the right to claim the same? This is a question that a court would ask, and we are convinced that it would answer in the affirmative. Of course, we are sorry that "X" should have done work at a loss, but we hope that his case will serve to show architects, particularly the younger ones, the importance that the law attaches to a professional man's valuation of his own services. Many a young architect, who in his anxiety to get a chance to show what he can do, yields to the temptation to accept work for less than it is worth, finds that the fact of having once done work at a low rate diminishes his reputation, and reduces his income, for years afterwards. He has become known as a cheap man, and thenceforth those who want the best service avoid him, while those who come to him with other views indignantly depart if he ventures to suggest that he has raised his charges. It is for this reason, perhaps more than any other, that the regular schedule is valuable. Although the reproach is often quite unjustly brought against it that it reduces the compensation of the most eminent in the profession to that of inexperienced beginners, it at least furnishes the latter with an invaluable support. Unless they themselves proclaim that their services are worth less than those of ordinary reputable members of the profession, the schedule will furnish the rule by which their duty and their reward are to be measured, and that the standing, and even the existence, of the profession depends upon the maintenance of some such code is shown by the experience of all civilized nations. — EDS. AMERICAN ARCHITECT.]

A TRACT ON COMPETITIONS.

ST. LOUIS, MO., August 15, 1893.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,— In relation to editorial in your issue of 12th inst., the undersigned begs to remark that at the convention of the American Institute of Architects in Chicago, in 1892, as chairman of the committee on competitions, he presented the accompanying outline for a circular to be printed and placed at the disposal of members who might wish the aid of the Institute in their attempts to persuade owners to conduct a proposed competition in a rational manner. This document was read at the convention, accepted, ordered placed on file and printed in the *Proceedings.*

Should there be a call for it, I presume there would be no difficulty in persuading the Directors to have a thousand copies printed for

circulation. After trial for a while, amendments might suggest themselves, and, in time, a very serviceable tract might be evolved, which would be of great service in the many cases where owners who invite competition err more through ignorance than by evil intent. Very respectfully, C. E. Illsley.

REPORT OF COMMITTEE ON COMPETITIONS. — PUBLICATIONS OF THE AMERICAN INSTITUTE OF ARCHITECTS.

(Series . . . No. . . .)

Suggestions to owners and architects in the management of architectural competitions.

At the annual convention of the American Institute of Architects, in the City of Chicago, October 20, 1892, the following minute on the conduct of architectural competitions was approved and ordered printed for gratuitous distribution in such manner as might be ordered by the Board of Directors.

While the American Institute of Architects emphatically disapproves of architectural competitions as usually conducted, long experience having shown that they result almost invariably in disappointment and harm to all interests concerned, to the public as well as to the profession, and to owners equally with architects; and while the Institute advises that wherever practicable an architect should be selected individually in the same manner with lawyers, physicians and other professional men; still whereas on Government work, for any reason an architectural competition is unavoidable, the following precautions are suggested to both owners and architects as calculated to obviate the principal causes of miscarriage and to enlist the coöperation of architects who will otherwise be likely to refuse participation in the competition:

1. An experienced architect of repute should be engaged by the owners at the start as consulting-architect throughout the competition. All the papers and correspondence should be controlled by him. Of course he will not participate as competitor.

2. The rules and restrictions should be few as possible and so explicitly stated as to prevent misunderstanding.

3. Two kinds of competition are customary, namely, an open and a limited competition. In the latter a certain number of architects are invited to submit designs, and all others are excluded. In the former the competition is open to every one. An open competition is often preliminary to a limited competition confined to those architects (usually three to six in number) whose designs received in the open competition have been placed highest.

4. Every invited architect should be paid for his competitive design the schedule commission of one per cent on the estimated cost of the building. The architect whose design is placed highest should be guaranteed the work at the schedule fee of five per cent for plans and superintendence. Unsuccessful designs should be returned free to their author immediately after the award is made, no portion of them to be used without the consent of their authors.

5. The site of the building should be given and the requirements as to accommodation, cost, etc. It might be well to arrange the requirements in two classes, namely, those which are arbitrary and must be rigidly adhered to, and those which are advisory only. As a rule, owners will find their interests promoted by making the list of arbitrary conditions as small as possible.

6. All transactions relating to the competition should be in writing, and open to the inspection of each competitor.

7. A date should be fixed within which the awards should be announced and all premiums paid.

8. After the award, all drawings should be open to the inspection of all competitors for at least twenty-four hours. In many cases an exhibition open to the public would be desirable.

9. The selection and premiation of the designs should be made by a jury, of which at least two-thirds should be disinterested and experienced architects, whose report should be in writing, and accessible to each competing architect.

NOTES AND CLIPPINGS

The Lost Column of the Piazzetta, Venice. — Venice is at this moment in a state of great expectation. For it is believed that the long-lost Piazzetta column is on the eve of being recovered, after lying for the best part of eight centuries in the lagoon mud. The story which has long been accepted is that about the year 1080 Alexis Comnenus, that Emperor of Constantinople who restored the imperial greatness of his family, presented, out of gratitude for services rendered him by Venice, three splendid monolithic columns of Egyptian syenite to the city. These were duly received by the Doge, Domenico Selvo, and two of them, safely landed, stand to this day on the Piazzetta, one crowned by the Lion of St. Mark and the other by a statue of St. Theodore. But the third, either through awkwardness or some mishap of which history has failed to preserve the particulars, toppled into the Lagoon, and there has remained ever since. There is, however, another story, and possibly quite as authentic as its rival, which attributes an entirely different origin to the two columns on the Piazzetta and to the one in the mud, whence it is hoped it will soon be disinterred. According to this version, they were brought from Egypt as trophies after the crusading victories of Doge Domenico Michieli in Syria, about the year 1126. Nor were they all three of red Egyptian syenite, one of the two standing on the Piazzetta being actually gray. Finally, it is affirmed that they were actually set up, with their present fine capitals and bases, by a Lombard engineer, one Niccolo de' Barattieri, as late as 1180. As all the world knows, the gray monolith is surmounted by the bronze lion. This is in the Byzantine style, and, like the column on which it stands, has been attributed to the Emperors of the East. But it is now known to have been cast in Venice for the Doge Zianna, about 1178; while the marble statue of St. Theodore, standing upon a crocodile, was not placed on the sister pillar for more than fifty years subsequent to that date. Be that as it may, the third pillar has never had a place in the chronicles of the State of Venice. Some sceptics have even been ready to affirm that no such column ever existed, except in the imagination of the Venetians. Still, the story of a third pillar having been lost has never quite been abandoned. So firm was the belief in its being recoverable that a serious attempt was made in the sixteenth century to discover the spot where it was lying. Until last week every effort of the kind proved futile, and even now what is believed to be the long-lost pillar was come upon only by accident. At present a dredge, engaged in deepening the chief approach to the Lagoons from the Adriatic, is at work a few hundred yards behind the Church of San Giorgio Maggiore, built on an island opposite the Ducal Palace. On Friday the machine came to a sudden standstill. An examination by divers proved the obstruction to be an enormous column of stone, lying under some thirty feet of water. Instantly the news spread around, and as the poorest Venetian has some knowledge of his city's history, it was not long before all Venice was convinced that at last the third column which ought to have been in the Piazzetta was deep in the mud behind St. George's Church. Further examination shows that the pillar is nearly forty feet long and six feet in diameter, so that it is, at all events, a very remarkable find. — *London Standard.*

Moki Sand-painting. — Who ever heard of painting in sand? The Moki Indians understand that species of art. Two paintings of this kind, copied accurately from the originals, have been newly placed on exhibition at the National Museum. Perhaps they might better be called mosaics, being done in sand of six different colors on a flat horizontal surface. The colors are yellow, green, white, black and a mixture. Such pictures are made by Moki priests and priestesses on the floors of their subterranean chambers. The six colors stand for the cardinal points. Yellow is the north, green is the west, red is the south, white is the east, black is the region above and all colors signify the region below. One of the two sand-paintings is a copy of the kind of picture made for the annual ceremonial of the Moki women's festival to the Germ God which takes place in September. The work of art is executed during the progress of the secret rites. It represents two figures in an elaborate frame of different colors. On the left is a likeness of La-kone-ma-na, the patroness of the affair. She is clad in a white blanket. On the right is a portrait of one of the twin gods of war, who carries a zigzag of lightning in his hands. The other picture is a facsimile of the one made by the chief of the Fraternity of Antelopes at the festival of the snake dance. It is highly conventional in its character. Rain clouds are represented by semicircles. Parallel lines show the rain falling. Four odd-looking zigzag figures stand for the lightning snakes, which are respectively red, green, white and yellow. The green and white snakes are female and the yellow and red snakes are male. Around this sand-mosaic are performed the weird rites of the antelope priests, who sing songs embodying the mythological drama of the "Snake Hero." — *Washington Star.*

The *Builder* on the London Fire. — On Monday night July 17, London was the scene of a serious fire, such as we only expect to hear of from some jerry-built American or antediluvian Russian harbor town. A large number of well-stocked warehouses in St. Mary Axe were entirely destroyed, and many others much damaged. The actual cause of this conflagration is not yet known, but it is fairly certain that its extension was primarily due to the non-division into risks of the first warehouse attacked, then to the bad construction and crowded position of the neighboring buildings, and further to the organization and strength of our fire-brigade not permitting of an adequate attendance of appliances and men at once, on a first alarm, to so dangerous a district. Speaking of the latter it appears inconceivable why so fine a body of men should be continually handicapped by defective organization and irrational means of inter-communication. The seconds alone lost with the separate telephonic communication to each individual station mount up, and the average two minutes' "night alarm" is nearly treble what a perfect institution should aspire to. As usual, the large conflagration did not come alone; another serious one in the Brompton Road, and one at Aldgate, occurring about the same time, thus again giving London a night this summer in which it had three heavy fires, each insufficiently attended, and scarcely an engine left at home to protect the rest of the metropolitan area. In each case the consequences of the three outbreaks were nearly as bad as they could have been. — *The Builder.*

The Biter Bit. — The City of Paris is just at the present moment in rather a pretty dilemma. A dispute has been waging for a long time between the metropolis and the Department of the Seine-et-Oise relative to the impurities of the Seine water. Arrangements to remedy the evil were adopted, which took the form of the acquisition by the city of some large fields for filtration purposes. One of these fields belonged to a M. Louchet, formerly Mayor of Herblay, and which, it is said, he purchased for about 100 francs, or $20. He objected to his property being forcibly acquired, even for purposes of public utility. The matter was submitted for final decision to a jury of valuation composed, through carelessness on the part of the authorities, of proprietors in the same district, every one of them as bitterly opposed to the projected improvement as M. Louchet himself. M. Louchet began by demanding 10,000,000 francs, or about $2,000,000, his aim being to render the price prohibitive; and to his immense surprise, the jury actually awarded the sum demanded. According to the legal experts who have been consulted, the award appears likely to hold good since the corporation cannot now refuse to purchase after having pledged itself to accept. Efforts are being made to find some flaw in the process with a view to upsetting the verdict of the jury. — *New York Tribune.*

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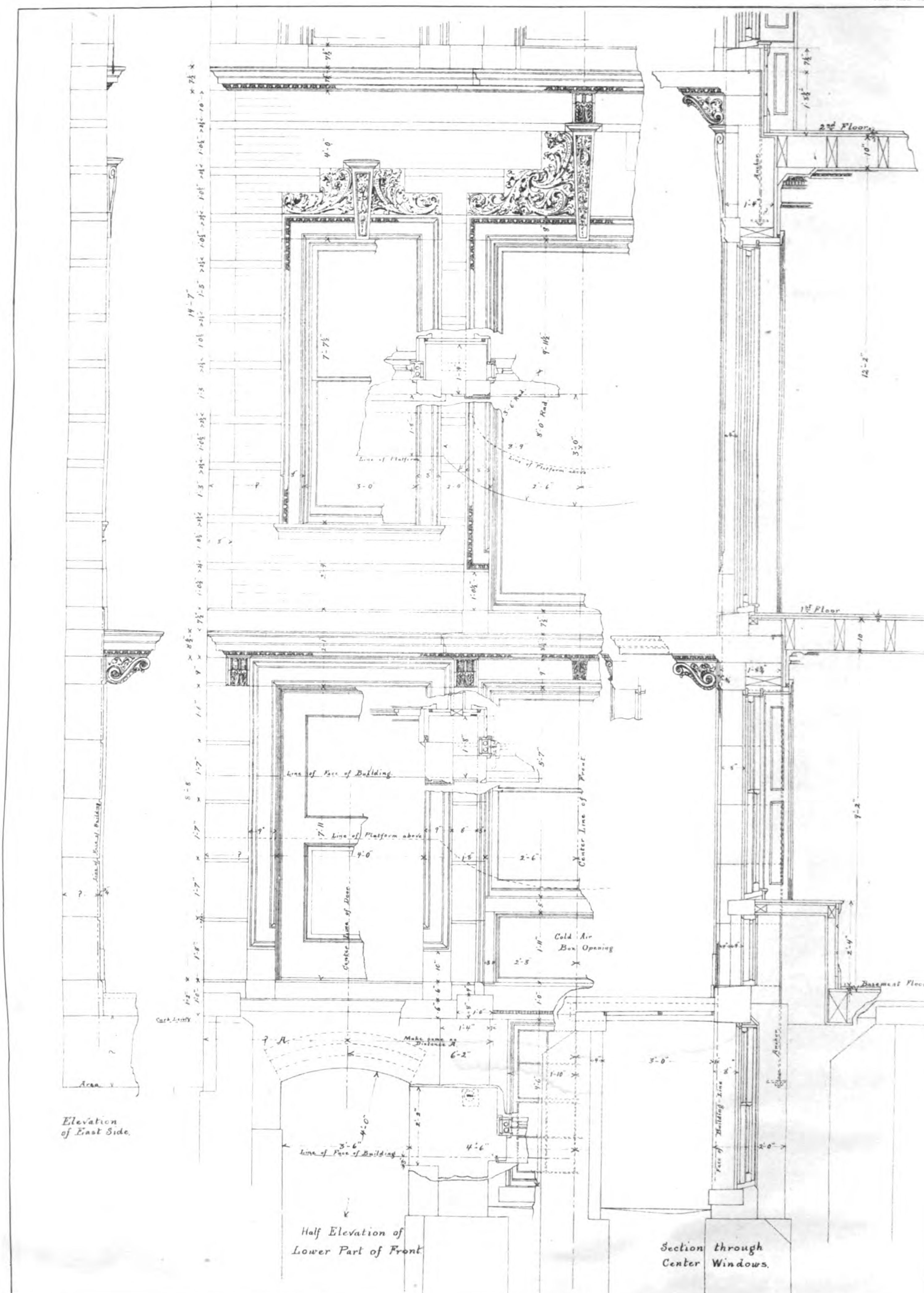
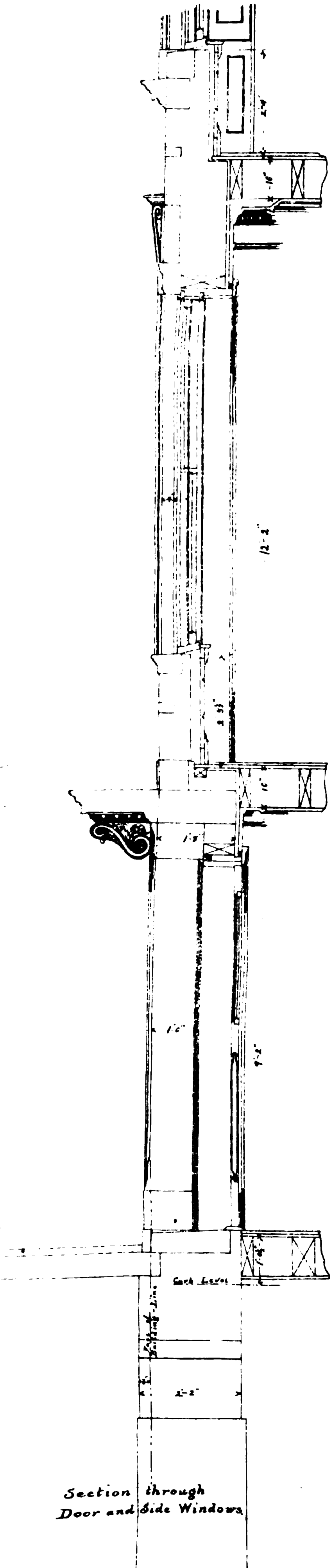
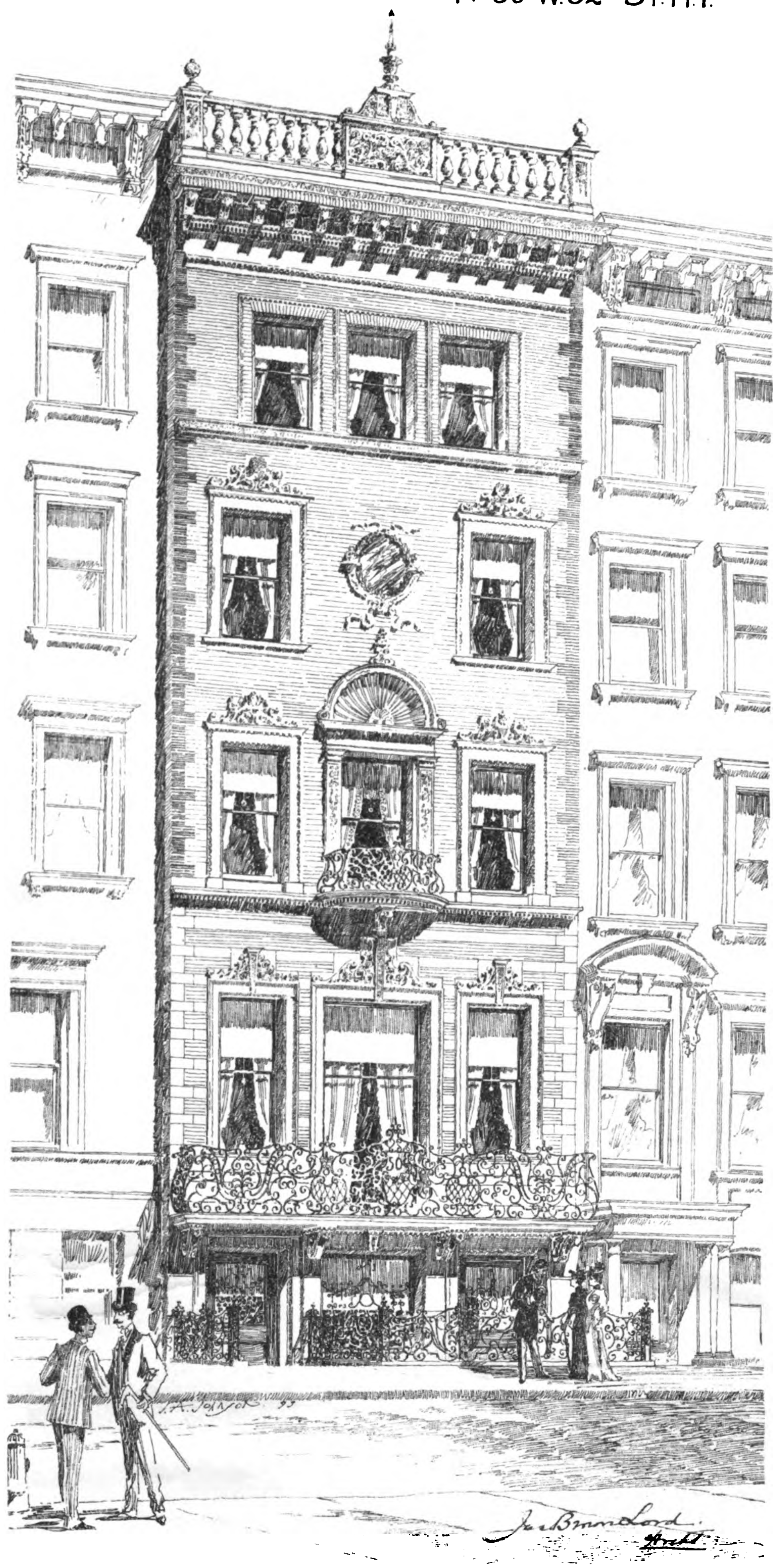

2nd Floor
1st Floor
Basement Floor
Line of Platform
Line of Platform above
Line of Face of Building
Center Line of Front
Centre Line of Door
Cold Air Box Opening
Make same as Distance A
Face of Building Line
Anchor
Area
Curb Line
Elevation of East Side.
Half Elevation of Lower Part of Front
Section through Center Windows.

House of J.W. Henning, Esq.
No 50 W. 52nd St. N.Y.



Section through Door and Side Windows



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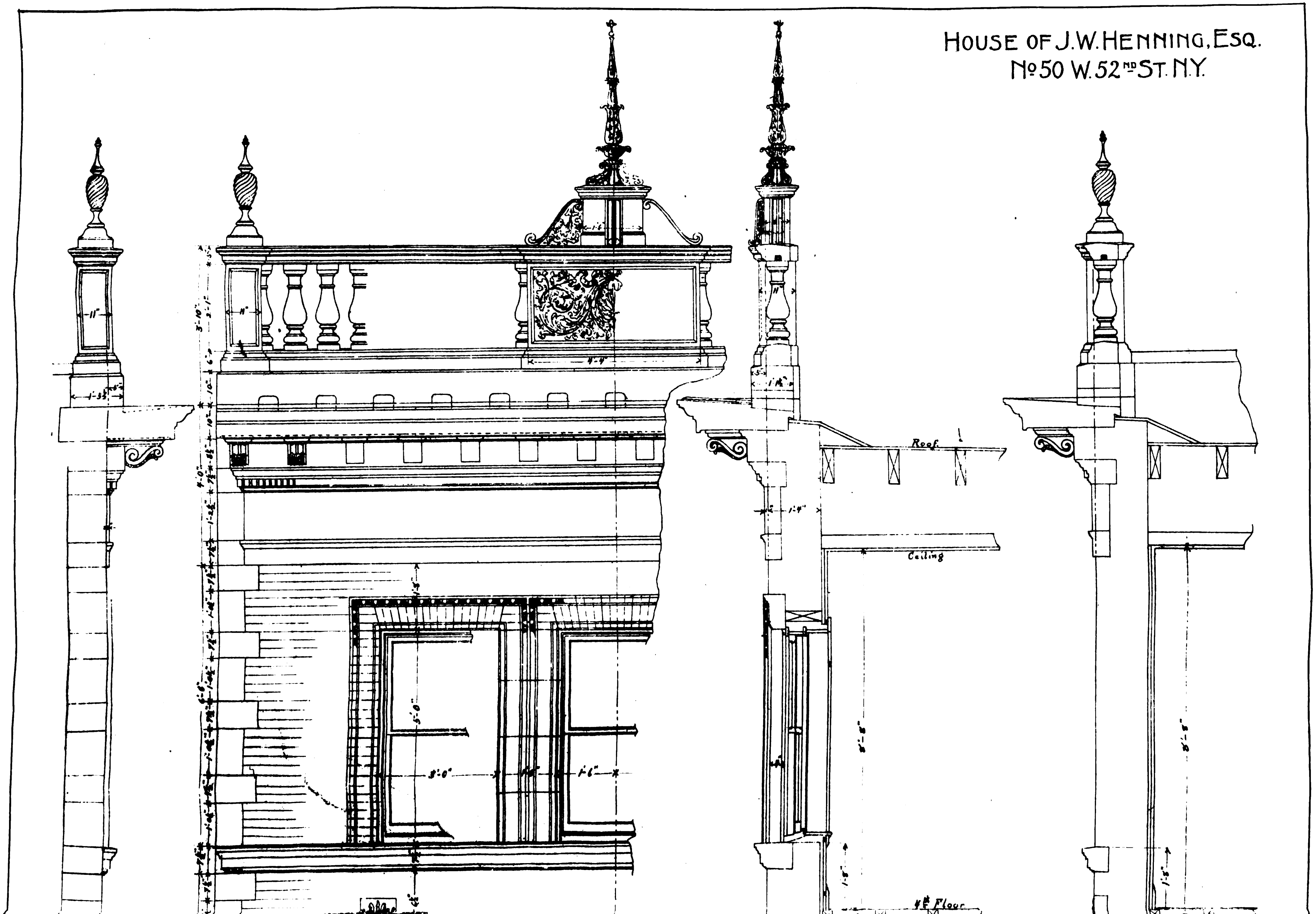
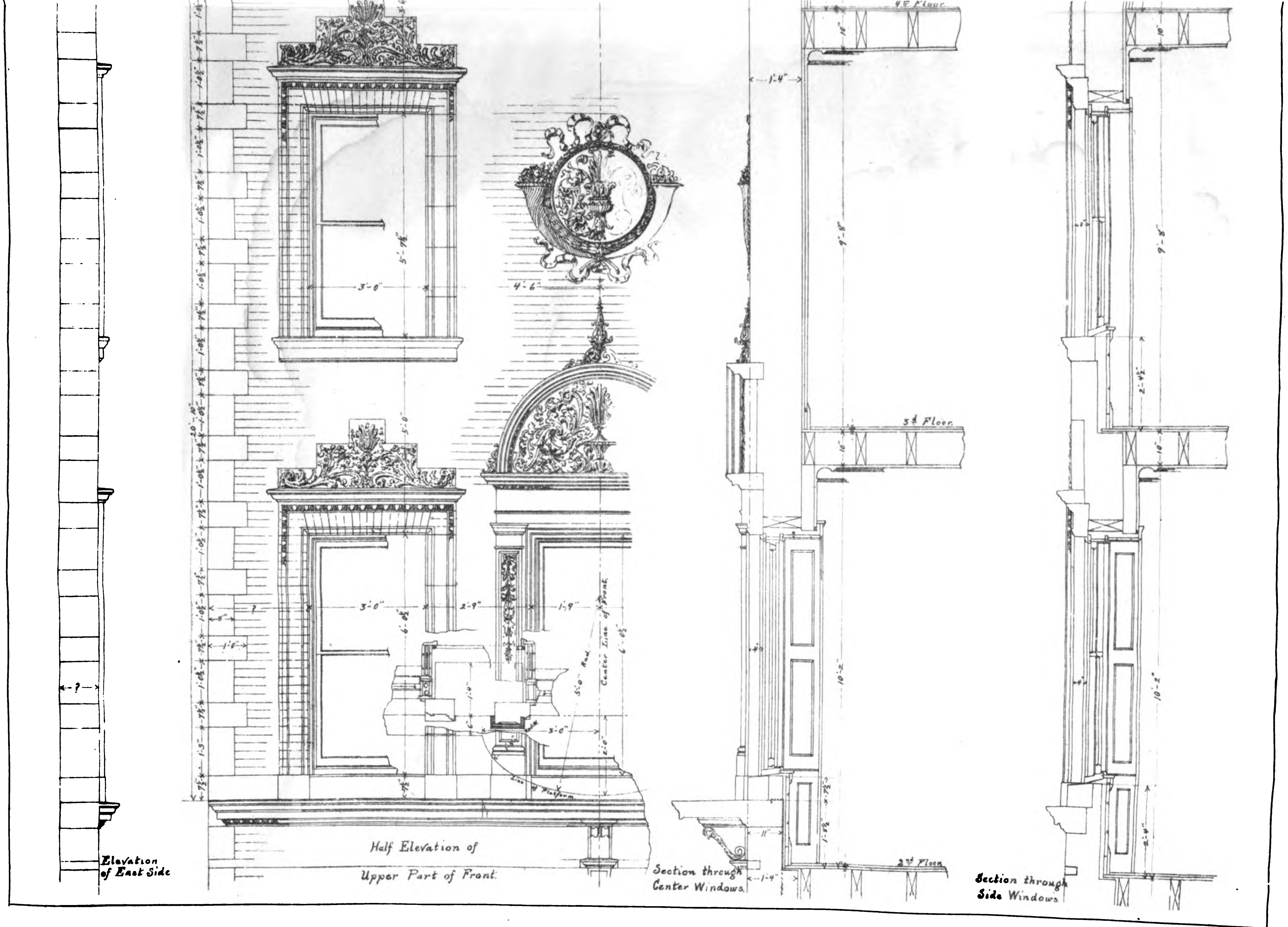
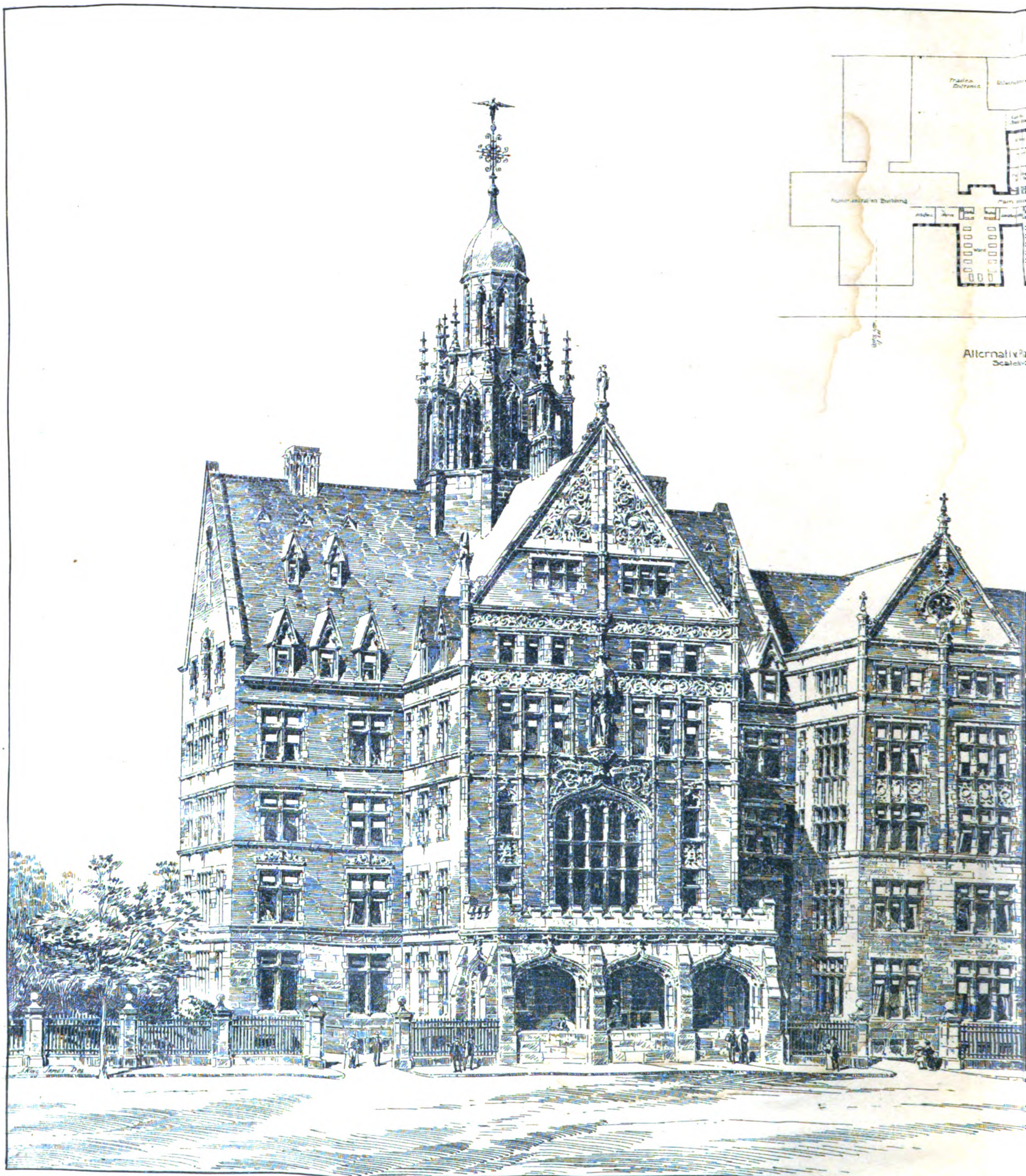

HOUSE OF J.W. HENNING, ESQ.
No 50 W. 52nd ST. N.Y.
Roof
Ceiling
4th Floor


Elevation of East Side
Half Elevation of Upper Part of Front.
Section through Center Windows.
Section through Side Windows.
4th Floor
3d Floor
2d Floor
Center Line of Front
Line of Platform

AMERICAN ARCHITECT AND BUI



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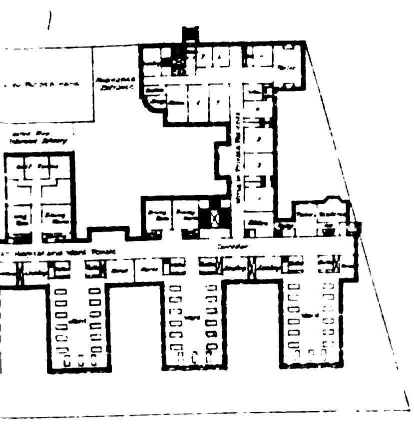
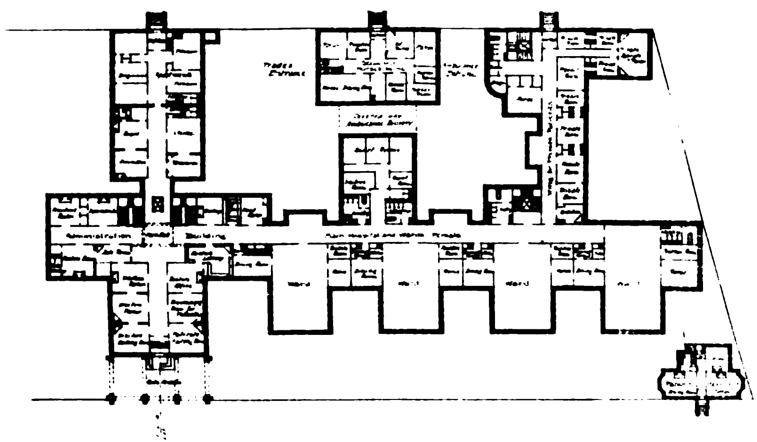

…e Plan of First Story


Original Plan of First Story
Scale 1/32 - One Foot

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…SED DESIGN
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THE AMERICAN ARCHITECT AND BUILDING NEWS.

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SEPTEMBER 2, 1893.

CONTENTS

THE twelfth Autumn Exhibition of the National Academy of Design will open on Monday, December 18, and close on Saturday, January 13. As before, only original works in oil, pastel or sculpture are admitted, which must be by living artists, and must never before have been publicly exhibited in New York or Brooklyn. Works will be received on Friday, Saturday and Monday, November 24, 25 and 27, and lists must be sent to the superintendent before November 20. Varnishing day is Friday, December 15. Exhibitors must themselves attend to the delivery and removal of their works, and not more than three works will be received by any one artist. A competent person will attend to sales of works, on which a commission of ten per cent will be charged. All contributions will be subject to the judgment of a jury of selection. We have received also the usual notice of the opening of the schools of the Academy for the season of 1893–4, beginning October 2 and ending May 12. The classes are substantially the same that they were in our own student days, we do not like to say how many years ago; but since then prizes have been founded, both in the shape of medals and money, besides the recent William F. Havemeyer scholarship of seven hundred and fifty dollars, to be expended in foreign study, and the Academy student, if he is obliged to depend upon himself perhaps a little more than he always likes, has plenty of incentive to effort.

A CURIOUS case, involving the rights of the sender of a letter, has been brought to the attention of the Post-office authorities at Washington. Not long ago, a woman named Horton, living in San José, Cal., wrote a letter to a man named Hagan, who lived in Oakland. She put a special-delivery stamp on the letter, and wrote on the envelope: "Do not deliver to any one except the person addressed, and him in person." The postmaster at Oakland tried to find Hagan, without success, but, faithful to the direction written on the letter, refused to deliver it even to a member of Hagan's family, and at last returned it to the postmaster at San José. While the letter was in the latter's hands, the woman herself met Hagan in the street in San Francisco and shot him. She was arrested, and claimed that she killed him in self-defence. Hagan's relatives, however, surmised that the letter which she had written him, and which had not been delivered, contained threats, which would show that the murder was premeditated, and they tried to get possession of it, on the ground that it belonged to them, as his representatives. It has been the general rule of the Post-office Department that letters should be delivered to the person to whom they were addressed, or, if he could not be found, to any of his family, and the question was whether the wish of the sender, as indicated on the envelope, was paramount to the custom of the Post-office. It appeared, however, that a special rule had been recently adopted, expressly providing that the sender of a letter might order its delivery to one person alone, and that this direction should be respected, and the postmaster at San José was therefore notified to return the letter only to the Horton woman or her authorized representative. Naturally, the murderess will take care that any incriminating evidence that there may be in it shall never see the light, and the prosecution will have to get on without it. In this particular case, it seems as if the arm of justice in California must be either very short or very weak, or the letter would have been brought into court, notwithstanding the rules of the Post-office. Even if the Post-office officials think it their duty to guard the secrets of criminals, the criminals themselves are not entitled to conceal the evidence against them, and there seems to have been no reason why the letter should not have been seized as soon as it left the possession of the postmaster at San José.

WE have received an unusually large assortment this week of invitations to architects to "submit plans" for "as large, handsome and convenient structure as can be completed at a cost not to exceed $70,000," etc., the architect being either required to deposit two thousand dollars, to be forfeited in case there shall be no bids from competent contractors when the plans and specifications are ready for estimate, to carry them into execution for a sum within that limit; or, in another case, to submit with his design "a written tender of the cost of such plans and specifications." The "invitation" containing the latter condition is a curiosity in various ways. It calls for designs for a normal school-building, to cost fifty thousand dollars, including "labratories," and a gymnasium with a "running track supported on iron brackets." The circular is dated August 22, and competitors are required to furnish plans of basement, first floor, second floor, attic and roof, with elevations of all sides and at least one section, all drawn on tracing-cloth at a scale of one-eighth of an inch to one foot, and accompanied with "complete and concise" specifications, and an estimate of cost, on or before September 8. Without any reflection upon this particular committee, we may remark that experienced architects usually infer from invitations giving such preposterously short time for preparation that the work has already been promised to some one in the background, and that the "invitations" are designed simply to obtain, at the expense of the profession, ideas for the benefit of the individual behind the scenes, some condition being cleverly added to the programme, by means of which the competitors can be got rid of after their ideas have been secured. What sort of ideas the Normal School Committee will obtain from the people who would pay any attention to their circular it would be interesting to know.

M. YVES GUYOT, whose encounter with the French walking-delegates was mentioned in these columns a few weeks ago, has put some reflections on the subject of labor-reform into a pamphlet, which has been published by Charles Delagrave, Paris, under the name of "*La Tyrannie Socialiste*," and will undoubtedly find many readers among those who, in their hearts, loathe the insolent egotism of the "workingmen's champions," but who have not the courage to defy their enmity. Speaking of the Socialists, who, in Europe, and to an increasing degree here, have usurped the control of the associations of workingmen, he says emphatically that their doctrines and methods are borrowed from Germany, and, so far from promoting the advance of liberty, are retrograde and reactionary, their whole system being devoted to the establishment of partial tyrannies, suited to be merged, later, in the comprehensive single tyranny to which it inevitably tends. To tie the Republican party of France to the tail of a system like that is, he thinks, to abandon all its noble traditions of freedom and respect for human rights, and he protests against the weakness which has allowed the pushing, crowding, loquacious labor-reformers to impose their sophisms on legislation, to the detriment of liberty. We need hardly say that the same observations apply here as in our sister Republic across the sea. Here, as there, the doctrine that men can combine

to force other men to join them, and can conspire to rob, starve, injure and even kill those who refuse to obey their orders, although still strenuously resisted by the courts, has found its way into legislation, and here, as there, it is likely to grow more aggressive as its control over elections becomes more complete, until some one finds the courage, like M. Yves Guyot, to expose himself to the vengeance of what is now a great, unscrupulous and cruel power for the sake of bringing back his countrymen to the principles of true liberty. The task is not likely to be an easy or pleasant one, but it will have to be undertaken before long, and whoever is brave enough to lead in it will find himself famous. Already, M. Yves Guyot, by his memorable speech on the Bourse du Travail, has set his fellow-citizens to thinking seriously on these matters, and the result of their cogitations may undoubtedly be traced in the elections of this week, in which, while the moderate Republicans have made an immense gain, the Socialist influence in the Chamber of Deputies has been much reduced.

AN important competition has just been decided in Paris. Since the burning of the Opéra Comique, there has been a great deal of discussion as to the way in which designs should be obtained for a new building. The Government officials in charge of the matter were for a time possessed with the idea, which is rather common among gentry of that class, that suitable plans for the structure might, by some sort of hocus-pocus, be obtained for less than it was worth to make them; but a series of experiments convinced them that they were mistaken, and a competition was at last opened on the usual terms. This competition attracted the best architects in France, and much interest has been shown by the profession in the result. By the final decision of the jury, the first prize, with the execution of the work, was awarded to M. Louis Bernier, of Paris, an architect of very great talent, and, as a pupil of M. Daumet, probably known to some of our readers. The second prize, a money premium of six thousand francs, was awarded to MM. Larche and Nachon, and the third, of four thousand francs, to M. Blondel. A further sum of ten thousand francs was divided among five competitors, MM. Gaspard André, of Lyons, Esquié, Adrien Chancel and Dupuis, and Duvert and Charpentier; while honorable mentions were awarded to MM. Ballu, Bernard, Cousin, Blavette, Bréasson and Camut, Breffendille, Brumeau, Courtois-Suffit, Dauphin, Delestre, Gervais, Gerault, Henry and Massa, Leclerc, Mayeux, Morice, Paulin, Gray and Bossis, Pujol, Raulin, Ruy and Loison, Schmit, Tronchet, Rey and Richard. It will be observed that this list of "recompenses" includes the names of a large part of the most distinguished architects in France, and M. Bernier may feel a just pride in having surpassed rivals of such fame. He has, however, already won so high a place in the profession that his victory cannot be called a surprise. He won the prize of Rome in 1872, besides a gold medal and the Cross of the Legion of Honor, at the time of the Exposition of 1889.

LA SEMAINE DES CONSTRUCTEURS gives an account of the proceedings of the jury which awarded the prizes. The jury consisted of twenty-two members. Five of these, MM. Coquart, Ginain, Gaudet, Deslignières and Sédille, were architects chosen by the competitors; five other architects, MM. Garnier, Pascal, Daumet, Moyaux and Vandremer, holding the official rank of General Inspectors of Civil Buildings, were designated by the Government, and to these were added M. Bouvard, the distinguished Inspector-General of Architecture to the City of Paris, who represented the Prefect of the Seine; M. Bunel, the architect of the Prefecture of Police, designated by the Prefect of Police; M. Roujon, the Director of Fine Arts; M. Carvalho, the Director of the Opéra Comique; M. Regnier, the Government Commissioner of subsidized theatres; M. Jules Comte, Director of Civil Buildings; two senators, MM. Bardoux and Morris; two deputies, MM. Mesureur and Delaunay; and two members of the Municipal Council, MM. Sauton and Caron. It will be observed that twelve out of the twenty-two jurors were professional architects, and, of the others, three or four, at least, were entitled to a place on it by their special knowledge of the requirements of theatres. Five meetings of the jury were held. At the first, a general inspection was made of the eighty-four designs submitted, and it was discovered that some of them exceeded the limits of site imposed by the programme. In a few of these the projections beyond the limit were slight, and apparently inadvertent, and would be easily corrected on more careful study. The jury, therefore, decided that, as there was evidently no intention of exceeding the limit, the slight inexactness of the drawings ought not to exclude such designs; but in the case of three plans, which intentionally exceeded the limit fixed by the programme, it was decided that they ought not to be considered at all, and they were accordingly set at once aside.

TO decide among the eighty-one designs remaining, the jury began by eliminating the worst. This was done little by little, until only twenty-two remained, among which the prizes were to be distributed. The votes were then taken by ballot, the first ballot being on the question of the award of the first prize, carrying with it the execution of the work. Only twenty of the jury being present and voting, a majority would be eleven votes, and at the first ballot M. Bernier received eight, MM. Duvert and Charpentier being next with four, and the others being scattered. A second ballot was therefore taken, in which three of the admirers of MM. Duvert and Charpentier seem to have gone over to M. Bernier, who received eleven votes, MM. Larche and Nachon being next with five. This ballot was decisive, and the first place was awarded to M. Bernier. The next ballot was for the second prize. Strange to say, MM. Duvert and Charpentier, who received four votes for the first place on the first ballot, received only one vote for the second place, and MM. Larche and Nachon easily took the second prize with thirteen votes. The third prize was awarded, on the first ballot, to M. Blondel, M. Esquié coming next. In place of a fourth prize, five equal prizes were offered, of two thousand francs each, and each member of the jury wrote five names on his ballot. The result of the vote was that only three competitors, MM. André, Duvert and Charpentier and Esquié, received more than two votes, and it was necessary to take a second ballot, each voter putting two names on his ballot. Again, only one person, M. Chancel, received a majority of votes, and a third ballot was required, which resulted in awarding the last of the prizes to M. Dupuis. The other selected competitors were consoled with honorable mentions, and so ended one of the most noted of modern competitions.

AN important step toward rapid transit in Paris is being quietly taken by one of the great Railway corporations, the Orleans Railway Company, which owns a short suburban line, extending to Sceaux, with a station in the remote depths of southern Paris, beyond the Observatory. Wishing to make this line more available, as well as to give a short local line within the city itself, the company has for some time been extending its tracks northward from its present terminus. The new extension is something more than a mile and a half in length, and is nearly all underground. From the present station, the tracks run in the open air for about three hundred yards, and then enter a tunnel, emerging again near the Observatory, where there is to be a way station. Another open cutting of a hundred yards leads the line to a second tunnel, more than a mile long, under the Boulevard Saint-Michel, which it follows to the Garden of the Luxembourg, where there is to be a new terminus, close to the Pantheon. The tunnel is already complete, with the exception of about a hundred yards, and it is expected that the line will be open to traffic by the end of next year. This will make the Sceaux station the most central in Paris, considering the Louvre to be the central point, and the effect of the change on the traffic of the line will probably be important. If this new movement on the part of the Orleans Railway Company should inspire the other lines to make similar extensions, the convenience of the public would be greatly promoted. An underground extension of the same length as that of the Sceaux line would bring trains from the present Saint-Lazare station to the Louvre, and a rather longer one would extend the Lyons railway to the same point, very much to the advantage of travellers, who, arriving from the Mediterranean, and wishing to take the first train for Havre, are obliged to load their baggage on a cab and thread the crowded streets for about three miles to the proper station.

OFFICE-HELP FOR ARCHITECTS.[1] — XVII.

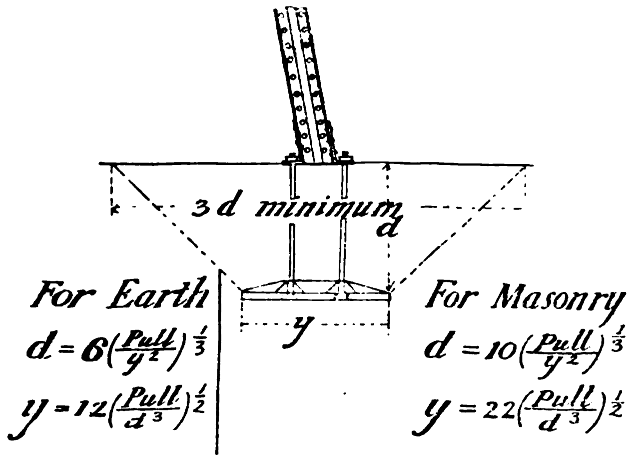


Fig. 69.

SECTION IV. — TOWERS:

§ 243. Type: — In architectural practice, towers are used for wind-mills and for the towers of buildings or alone. When alone they are usually of masonry and then are proportioned as a chimney, § 285.

§ 244. Proportioning: — Wind-mill towers must be made stiff enough, as well as strong enough, and therefore the pressures against the wheel should be assumed at 30 pounds per square foot against a surface equal in area to the area of a circle of diameter equal to the diameter of the wheel, acting in a horizontal direction against the wheel. A pressure of 50 pounds per square foot should be allowed for all exposed surfaces and for all platforms, tanks, etc. The vertical loads will be the weight of the tower, the weight of the mill, which will be about 1 ton [See Chapter XII], the weight of the tanks, if any, and of the platforms. The effect of the wind on the mill and other exposed surfaces will probably cause an upward reaction on the windward side of the tower which must be met by anchor-bolts. (Fig. 69.) The *S L*, *W L*, and *W R* diagrams must be carefully drawn and tabulated and the sizes of the pieces determined from them. If a curved profile is used for the legs of the tower, the lines representing the several pieces must be drawn straight from joint to joint and then the bending-moments found for the parts, by measuring the distance in inches from the line connecting the joints to the neutral axis of the piece and multiplying it by the strain found.

The size of the anchor-plates through which the bolts pass must be such that a weight of earth or masonry will have to be lifted equal to twice the upward resultant, to disturb the tower. Towers for ornamental purposes, for buildings, etc., must be treated for stiffness also. The loads will be those due to wind-pressures, figured at 50 square feet on the entire projected area of the tower, wind-pressure on flag giving a pull on the pole at the centre of the flag of 3 pounds per square foot of flag, the weight of the tower acting downward, and the upward pressure of the wind acting under the lantern, which may be neglected.

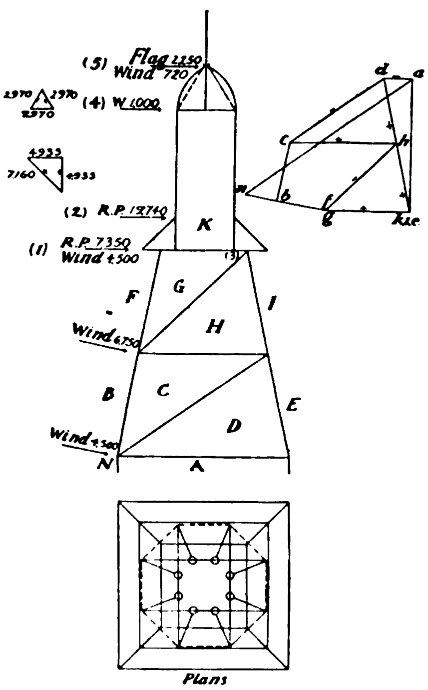


Fig. 70.

Referring to Figure 70, the tower should be laid out in skeleton and the calculation worked out as follows:

Starting at the top with the assumption that the flag, 10′ 0″ × 15′ 0″, is carried on a pole with its centre 25 feet above the ring, we should have the pull at the ring (5) equal to 2,250 pounds, if we take moments at (4). Plotting this for the strains in the curved ribs, we would find a tension on one side and a compression on the other side, each equal to 2.970 pounds which, multiplied by the distance from the straight lines to the centre of the curved line, would give a bending-moment of 29,700 inch-pounds, requiring an *R* of 2.38. As this is to be divided among four members, and as it will be convenient to make each member either a T or two Ls back to back, we would use for each member two 3″ × 2″ × $\frac{7}{32}$″ Ls curved to the proper shape. For the spider on which the pole rests, we would make the socket of cast-iron and assume that the weight of the pole and the weight of the metal would be about 1,000 pounds, we would then have a bending-moment of 24,000 inch-pounds to be divided between two members, and we would use a $3\frac{1}{2}$″ × 3″ × $\frac{5}{16}$″ L. This would be riveted to a ring at (4) which ring would be a 5″ × $\frac{3}{8}$″ plate encircling the heads of the columns.

For the part between (2) and (4) where the columns of the lantern would come, no sway-bracing is practicable; we must therefore find the bending-moment at (2) from (4) and (5). This amounts to 971,000 inch-pounds requiring an *R* of 77.8 for all of the columns or 19.4 for each one of the four, and for this purpose we would use a 9″ 22* *I* encasing it in the column.

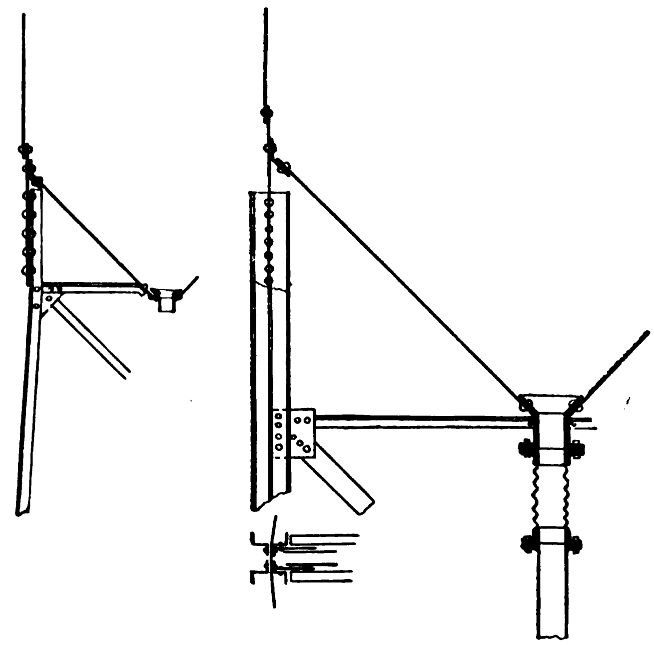


Fig. 71.

[1] By George Hill, Consulting Engineer. Continued from No. 920, page 100

ABBREVIATIONS AND SYMBOLS.

= equal to.	∴ therefore.
‖ parallel to.	□′ square feet.
÷ divided by.	□″ square inches.
× multiplied by.	8* read 8 pounds per lineal foot.
+ added to.	[channel bar.
a^2 a multiplied by itself.	I I-beam.
$a > b$: — a greater than b.	T T-iron.
$a < b$: — a less than b.	L angle iron.
$\frac{a}{b}$: — a divided by b.	⊥ deck beam.
	● round section.

I ton = 2,000 pounds as this is the conventional ton, the legal ton is 2,240 pounds, but is rarely used.
l = the length between supports of any beam or girder or height of any column, always in feet.
b = breadth of any beam or girder, always in inches.
d = depth of any beam or girder, or the least transverse dimension of any column, always in inches.
L = total load uniformly distributed coming on any piece in pounds.
$L^{□′}$ = " " " " per square foot in pounds.
W = concentrated load on any piece in pounds.
s = span of any arch or truss between centres of end pins in feet, or spread of footing courses.
A = area of any section in square inches.
M = maximum bending-moment in inch pounds.
n = distance of centre of gravity of section from either top or bottom edge in inches.
I = moment of inertia, neutral axis through centre of gravity.
R = moment of resistance of section.
r = radius of gyration, in inches.
Sc = safe compressive strain in pounds per square inch.
St = " tensile " " " " " "
Ss = " shearing " " " " " "
S = strain per square inch in extreme fibre.
P_e = upward reaction of support at left-hand end of beam.
P_f = " " " " " right " " " "
e = distance of centre of gravity of load from left hand of beam.
f = " " " " " " " " right " " "

To hold these columns in place, we would have a pressure at (2) taking moments about (1) equalling 19,740 pounds, one-quarter of which equals 4.935, which, resolved, gives a pressure along the gusset-plate of 7,160 pounds requiring .57 square inch of section. We would then use a ¼″ plate and 3″ × 2″ × $7\frac{7}{32}$″ ⌊s in pairs around it, riveting them to the flanges of the beam. The platform at (1) would be made an octagonal ⅜″ plate carried on beams as shown, the beams being made to resist the bending-moment transmitted to the outer end by the diagonal thrust from the connection which amounts to an R of 7.1. The effect of the pressure of the lantern at (3) on the beam, taking moments about the end of the beam, would be such as to require an R of 9.9 and we would therefore use a 7″ 15* i cantilevering it over the joints at $F\,K$ and $K\,I$. A beam of the same size would be coped in between these beams and cantilevered beyond them for supports as shown. The 9″ columns forming the lantern would be further stiffened by having ¼″ plates put in the vertical height between (1) and (2), riveted up to the webs of the beams and stiffened along the top edge with a 3″ × 2″ × $\frac{7}{32}$″ ⌊. This brings the analysis of the tower down to the level of the joint $G\,K$ from which point below it is simple. At $F\,K$, however, moments must be taken about $N\,B$ to determine the effect of the wind-pressure on the lantern at this point and that is as shown.

For the $W\,L$ analysis given, the assumption is that the reaction at $A\,E$ is vertical. The effect, however, on the tops of the columns at these points would be divided equally between them. If the frame is carried out in this way, there will be quite a surplus of strength in the connections which is very desirable. It should be the aim in designing all towers where sway-bracing is impracticable to obtain a sufficiently wide spread as at $G\,K$ to secure the joints, making them amply strong.

§ 245. Details:—For ordinary towers ⌊s are the most useful shapes and should be used. The connections should be made with plates of the thickness of the ⌊s and riveted up generally with the rivets in single shear in the diagonals and double shear in the legs. When the tower is meant for the support of a large metal tank, the bottom of the tank should be made hemispherical or conical and riveted to the sides, then the legs can be fastened to the rings formed by this double thickness of plate, reinforced or carried down if necessary, and a great economy of floor-framing effected. [See Chapter XII, and Figure 71.] The pressure on the rivets will be equal to the total weight of water when the tank is full, and the riveting must be of sufficient strength to carry it. A sufficient number of 1½″ bolts should be provided for the anchorage to resist the overturning effect of the wind assumed as acting on a plane equal to the projection of the tank against a vertical plane, with a pressure of 50 pounds per square foot when the tank is empty. The anchorage plates must be of sufficient size to lift masonry or earth equal to twice the weight of the upward resultant. If the tower have a curved profile the bending-moment due to the curve must be allowed for in the sizes. Generally wood may be used when it is twenty times the section of the metal pieces, or having the sizes of a wooden tower that experience has found to be sufficiently stiff, a steel tower can be made having the parts one-twentieth of the area, if the r is sufficient and R is large enough for the bending-moments due to curved sections. Generally r is so small that the sections must be doubled in area, or made one-tenth of the area of the wood.

SECTION V.—TRUSSED ARCHES:

§ 246. Type:—Usually a trussed rib of metal in which the thrust is taken up either by heavy abutments, by tension-rods running from end pin to end pin or by the lower chord of the rib, when its shape will admit of it. Wrought-iron or steel must be used for spans of large size and are generally cheaper and better for all spans.

§ 247. Proportioning:—The truss and the strain-diagrams must be drawn to a large scale with very fine lines and the strain-diagrams carried out to a closure to prove the accuracy of the work. The results must be fully tabulated as explained in § 235. The end pin should be made of ample size to reduce the pressure within reasonable limits, say 15,000 pounds per square inch. The parts should also be accessible for examination and painting. The lower part of the rib should be made with a solid web-plate filling the entire space between the chords. The plate should be stiffened with ⌊s on the line of the diagonal bracing, well riveted. The bases which carry the truss should be made very like a column base with the spread sufficient to properly distribute the load on the foundations. When the base is set, it should be set on several thicknesses of building-felt as described for column-bases so as to secure an initial deflection of the plate. An excellent example can be seen in the truss for the Philadelphia train-shed of the P. R. R. illustrated in the *Engineering Record*, Vol. XXVIII, No. 2.

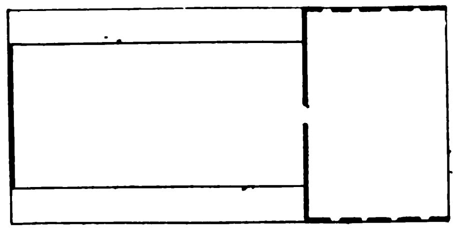


Fig. 72.

§ 248. Details:—The centre connection must be made with a large pin so as to admit of free movement of the truss under changes of temperature, or changes in the condition of loading. The top and bottom chords are carried out usually to make a finish at the apex but they should be made with a slip-joint. The chords are usually made of ⌊s and plates and are bent to a curve, in this case the bending-moments must be provided for. Connections between the diagonal bracing and the chords should be made with plates put between the ⌊s of the chords and riveted through. As to spacing of the ribs, see § 235. The tension-members, taking the entire thrust when made as a tie connecting the skew-backs, should be made with large plates and carefully boxed with creosoted timber so as to be at all times accessible for painting.

SECTION VI.—BRACING OF SKELETON CONSTRUCTION:

§ 249. General:—A skeleton-construction building is a tower or girder placed vertically. Its height therefore must be limited to five times the width of the lot or the least breadth of the building, whichever is less, with the addition of two or three stories if the building stands between new buildings of good height. Usually the building will be so arranged as to admit of proper diagonal bracing along the heavy lines of Figure 72. Generally the length of the building is sufficiently great to provide ample rigidity in the other direction, although it would be well to secure bracing in the walls shown with a heavy broken line. The bracing should be carried continuously from the foundations through to the roof, and should be analyzed in manner similar to that shown in Figure 73. The wind-pressure should be taken at 15 pounds per square foot and the strains due to it added into the other column strains. Should it be practicable to obtain additional bracing at some other point, as for example on each side of the elevator-well, trusses should be placed there also. In the case given, the assumption is that the bracing is for a 50′ × 100′ building in the interior of a block, as shown on Figure 72, and the analysis is for the pair of trusses which are shown to be on the end of the court and at the upper side of the elevator-well. In this case we would have as wind-pressures those due to the wind acting on the eight upper stories of a twelve-story building on a length thereof of 65′. The assumption is that if there are two portions of a building properly braced, the entire building will be sufficiently braced, since the floor-arches, floor-boarding, column-connections, etc., will be sufficiently rigid to warrant the assumption that each floor acts as a horizontal girder to transmit the pressures to the points of support. Three kinds of connections can be made, one in which the pressures are

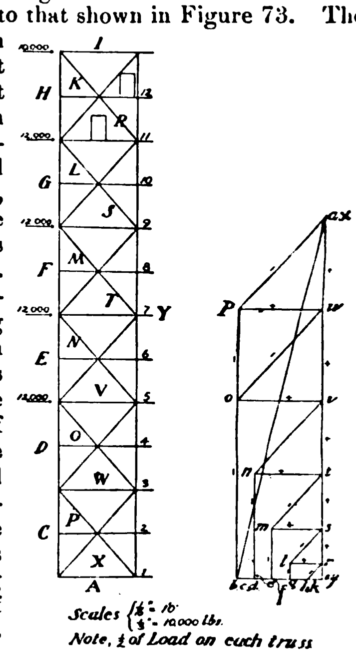


Fig. 73.

carried directly to the joint, one in which they produce a bending-moment in the column and one in which they produce a bending-moment in the girder. The architectural requirements determine which method should be used. If the building is not more than twice as high as it is broad, the diagonal bracing may be omitted, but the column and girder connections must then be made riveted throughout. The column-connections in fact, should always be made so as to develop the full transverse strength of the section.

(To be continued.)

MODERN ASYLUMS FOR THE INSANE.[1]—IV.

WARDS FOR EPILEPTIC, ACUTE, CHRONIC AND WORKING PATIENTS.—EPILEPTIC WARDS.

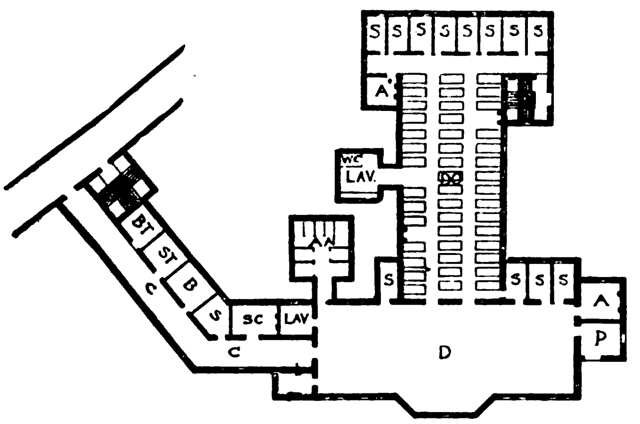


Fig. A.

A N	Annex.	C.	Corridor.	P.	Porch.
A.	Attendant.	D.	Day-room.	S.	Single room.
B.	Bath-room.	D O.	Dormitory.	S T.	Stores.
B T.	Boot-room.	Lav.	Lavatory.	S C.	Ward Scullery or Kitchen.

IT is highly desirable in all asylums that there should be in each section a small ward in which newly admitted patients may be placed under special observation, with a view to subsequent classification. Dormitories with single rooms should be set apart and arranged for the care and supervision (especially during the night) of epileptic and suicidal patients, and it is particularly needful to have an ample supply of single rooms for the epileptics. A provision should be made of an open panel four and one-half inches wide in the centre of doors of these rooms. This panel should be placed above the middle rail. This class of patients must be carefully watched, not only on account of the dangerous nature of the fits to which they are subject, but also for the protection from possible violence of other patients, nurses and attendants. Such open panels are not necessary in other rooms. For obvious reasons no associated dormitory should be planned to contain less than three patients.

An epileptic fit frequently comes on with great suddenness and the patient requires immediate attention. At times the assistance rendered by one official is quite insufficient, hence the absolute necessity for the architect to make every arrangement with a view of affording the fullest possible opportunities of supervising the day-rooms and dormitories and of glancing in at the patients in the single rooms unobserved and without disturbing the possibly sleeping patient.

We have frequently observed such patients both during and after a fit, and the sleep that usually follows the attacks is doubtless most beneficial to the patients, and undoubtedly affords a welcome respite to the attendants. We direct special attention to the importance of so disposing the buildings and airing-court for this class, that patients of the chronic, working, infirm or other description shall have as little view of them as may be, because the struggles and painful aspects of an epileptic fit are bad for any sane person to witness and cannot fail to excite the inmates of an asylum suffering from mental diseases of all kinds.

There should be, at least, two small rooms or lobbies provided near to the recreation-room, theatre and church, to which epileptic patients seized during a performance or a service may be immediately removed to receive attention or medical aid.

As an instance of the care and watchfulness required over epileptic cases, two cases of suffocation have been recently reported at Cane Hill Asylum. It is therefore the duty of the architect to devote all his skill in providing ample means to assist those who have the management and control of these unfortunate creatures. Accommodations should be provided for not less than one attendant to every ten patients, and one-fifth the dormitory accommodations should be arranged in single rooms of about one hundred superficial feet in area for each room. One padded-room is requisite to each thirty epileptic patients. A small kitchen is needed for preparing sick-diet, and one bath for every fifteen persons, which should be either placed in the annex or in a special room near to the dormitory.

In many asylums the "epileptic" sleeping accommodation is entirely arranged upon the upper floors, but the danger of staircases to this class of patients is, of course, always present, and were it possible to economically arrange things otherwise, it would be well to keep all the epileptics upon the ground-floor level. This, however, is difficult to accomplish when taking into consideration the question of cost.

The epileptic buildings should, as already stated, always contain a large proportion of single rooms; these and all other rooms should be well lighted and cheerful so as to prevent the resemblance to prison-cells so frequently found in old, and sometimes even in new asylums. Where the windows are placed high up and over the roofs of adjoining corridors, there is a strong indication of want of skill and knowledge on the part of the designers, as well as a total disregard of the best interest of the poor patients.

In the Figures *A* and *B*, we illustrate two examples of epileptic wards, showing what in our opinion should and should not be adopted.

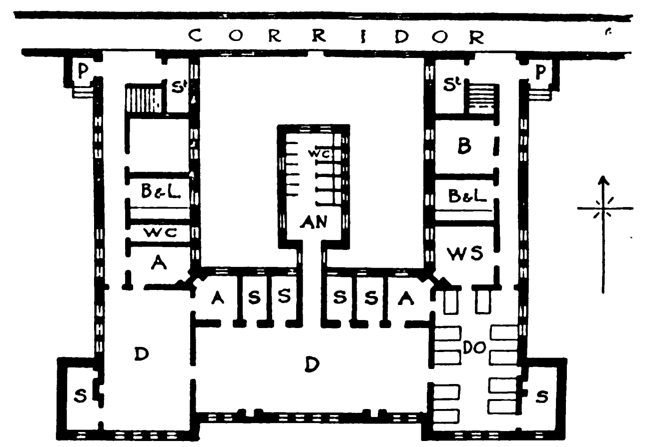


Fig. B.

A.	Attendant.	D O.	Dormitory.
A N.	Annex.	P.	Porch.
B.	Boot-room.	S.	Single room.
B & L.	Bath and Lavatory.	St.	Stores.
D.	Day-room.	W S.	Ward Scullery or Kitchen.

In plan *A* it will be seen at a glance that one of the worst features is the arrangement of three rows of beds in the dormitory; we have pointed out in a former chapter that there should never be more than two rows. The number of single rooms in this example is insufficient as compared with the number provided for in the dormitory, and the attendants' rooms, besides being inadequate in number, are badly placed as regards opportunities of observation over the ward generally. The day-room is badly arranged and it would have been better to have subdivided it, in order that the patients might be sub-classified according to their mental condition.

In Figure *B* is shown, also, a plan of a ward for epileptics, with accommodation for about sixty persons on the ground-floor and first floor, with six rooms on each floor devoted to single rooms and attendants. Room-space is provided for one attendant to every ten patients, and the rooms have openings to command both the day-rooms and dormitories. In this scheme there is a difference between the upper and ground floors; on the upper floor there would be only one day-room, but two associated sleeping-rooms, thus making with the two floors, accommodation for sixty patients. There would be two bath-rooms and lavatories on each floor, as well as provision for lavatories and water-closets in the annex. It will be noted that the day-rooms would have respectively a southern and western aspect. In this example a boot-room would be provided near each entrance, where the patients would leave their boots, and thus prevent dirt and dust being carried far into the building. One boot-room should be kept exclusively for the occupants of the upper floor, as it is always desirable to separate and sub-classify the inmates as much as possible. It will be noticed that a ward dining-room is not provided in this scheme (*B*), presumably for economical reasons. Therefore, in such cases, the patients would either have to dine in the general dining-room, which is undesirable, or one of the day-rooms would have to be used for a dining-room; if this were intended it shows the advantage of the plan in Figure *B* over that in Figure *A*, inasmuch as in *B* the day-room is divided and in *A* it is not.

To illustrate the necessity of providing space for "recent" cases where they can be properly examined and proper diagnosis made of the case, we may be pardoned for a slight digression from the strict architectural part of the subject by quoting a case which recently occurred in the Birmingham Borough Asylum. The same day a certain patient was admitted an entertainment was given at which all patients whose physical and mental condition would allow, as well as the greater part of the attendants, were stated to have been present, and the "recent" patient being considered harmless was left in a ward, where, it is said, a porter had charge, parading the various rooms. While the porter was in one part of the asylum, the newly admitted patient was seized with a violent mania and attacked his fellow-inmates who were in bed, killing one by splitting open his skull. [It should be remarked that this asylum is planned on lines now considered out of date, namely, the "corridor" system.] This

[1] By George H. Bibby, F. R. I. B. A., F. R. Hist. S., and Ernest A. E. Woodrow, A. R. I. B. A. Continued from No. 918, page 67.

as we have remarked, illustrates the need of a room for "recent" cases where the attendants can watch their patients, for in a common room the patient may be more watchful than the attendants, with the advantage that he has only the attendants to watch, while the attendants have several besides him.

In plan Figure *B* the day-rooms are so placed that such an event as the above, provided reasonable watch is maintained, is nearly impossible, as any disturbance in either day-room could be witnessed from two attendants' rooms through the glazed doors or inspection windows. The dormitory is similarly overlooked from the attendants' room and the ward scullery.

With regard to the passages and minor rooms, the safety of the inmates must depend upon the vigilance of the officers, quite as much as upon the disposition of the plan by the architect.

It should not be forgotten by the designer of an epileptic ward that patients may, and do have a dozen or more fits within twenty-four hours, and each fit demands instant attention, and that the officers must sometimes remain for a considerable time with the sufferer until he sleeps or can be removed to a single room.

It has been stated by an authority upon mental disease that many habitual criminals spring from families in which epilepsy exists, and that the cause of their death is often tubercular diseases, or diseases of the nervous system. "Crime," he states, "is a sort of outlet in which the unsound tendencies are discharged; they would go mad if they were not criminals, and they do not go mad because they are criminals."

Other epileptics are of a furious character, while others again are sometimes possessed by terrifying ideas, perceiving in those around them assassins attempting their lives; in these cases their fury is uncontrollable. The result of long-continued epilepsy is to impair and weaken the mental faculties, producing first failure of memory and subsequently a condition of dementia, but in the end both the moral and intellectual senses are involved in a common ruin. It is for this condition of mankind the architect must provide when designing epileptic wards in a modern lunatic asylum.

WARDS FOR THE ACUTE AND RECENT CASES.

In the wards for the acute and turbulent patients there should be one padded room for every thirty or thirty-five patients, which number

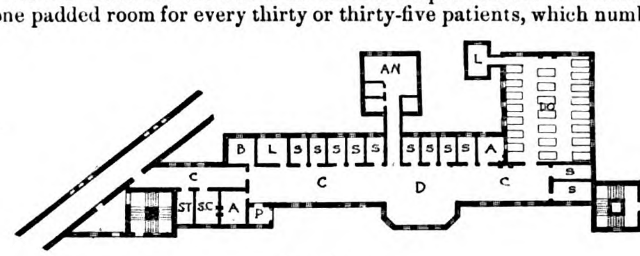


Fig. C.

A. Attendant.
AN. Annex.
B. Bath-room.
C. Corridor.
D. Day-room.
DO. Dormitory.
S. Single room.
SC. Ward Scullery or Kitchen.
ST. Stores.

should be under the care of at least three attendants. There should be a liberal supply of single rooms, as well as a storeroom and two baths, with a lavatory, which could be so arranged as to be a dressing-room or ante-room to the bath room. The closets, urinals, brush-room, slop-room, etc., should be provided as in all other wards and be placed in the annex, with sufficient means afforded for isolated ventilation.

Following the plan we have adopted in illustrating other wards of a modern lunatic asylum, we give in Figure *C* a plan for an acute-patients' ward which contains several features that should be carefully avoided. The large dormitory is so arranged that the patients and attendants have only one exit in case of fire or panic, and this point, in view of the dangerous condition of this class of patients, must have special consideration. The same remarks, already made as to the limit of two rows of beds in the dormitories apply here, there are obvious objections with regard to control, privacy and other conditions in having three rows of beds. Two attendants' rooms are not sufficient, a third should be provided where the number of patients is so large. The plan is so disposed that the medical superintendent would have to pass through the whole of the apartments and retrace all his steps, before reaching other scenes in his round of duties. This is a great waste of both the time and energy of an officer whose duties are most onerous and of the greatest importance. It is for the architect to contrive all parts of the asylum with a view of economizing the strength and labor of the medical and other officers.

In Figure *D* is a plan of an "acute" block which may be looked upon as a well thought-out scheme. The very-noisy cases can be easily separated from the other patients in the day-room and the dormitory, single rooms and attendants' rooms are well placed for purposes of observation and control and are conveniently arranged both for day and night duty. The medical superintendent after passing through all the rooms on the ground-floor, and seeing everything and all the patients, could ascend to the first floor by the one staircase, pass through the rooms and descend by the other staircase without traversing the same ground twice over. The upper floor would be used probably for recent cases, otherwise the plan would be similar to the floor below.

WARDS FOR CHRONIC AND WORKING PATIENTS.

The building to be provided by the architect for the reception of the chronic and working patients need not be as near the medical

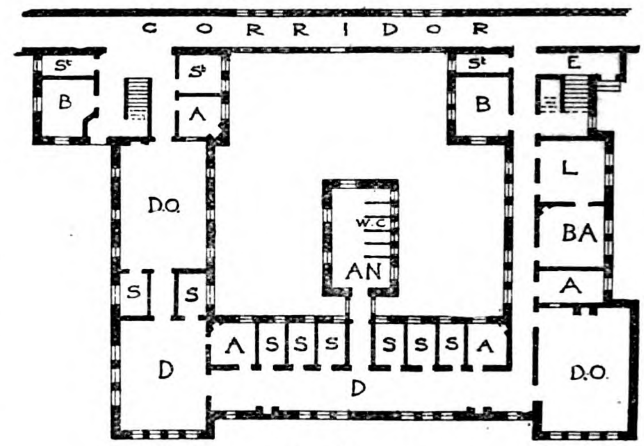


Fig. D.

A. Attendant.
AN. Annex.
B. Boot-room.
BA. Bath-room.
D. Day-room.
DO. Dormitory.
E. Entrance.
L. Lavatory.
S. Single room.
St. Stores.

officers' quarters and administrative officers as some of the other blocks, as for instance, the infirm and epileptics. Care must be taken so that those patients who can be employed in the grounds or upon the farm may not have to traverse the corridors or apartments occupied by, or adjacent to, other patients, for it must be remembered that these patients will often, though quite harmless, be noisy; apart from this their farm-work necessarily causes them to be less clean than those incapable of much work or the occupants of the workshops.

The workshops should, of course, be erected quite close to the ward devoted to the working patients, and arranged so that they may be reached under a roofed passage, if not through an enclosed corridor.

Attendants' rooms are required for this class of patients at the rate of one attendant for every fourteen or fifteen patients. The dormitory and day-room should not contain more than twenty patients each, so as to secure good supervision and opportunities for sub-classification. Although it is desirable to have a separate dining-room in this ward for those patients whose infirmities prohibit their assembling in the general dining-room, yet as the majority of this class can use the common dining-hall, the block should be placed somewhat near to it. There should be a few bath-rooms attached to this ward, although the greater number could, and probably would, use the general bath-room, which it will be our duty to describe hereafter.

The water-closet and lavatory accommodations should be upon a liberal scale both for day-rooms and dormitories, and placed so as to afford ample opportunities of control by the officers, on account of the filthy tendencies of certain descriptions of the chronic patients.

We give an illustration in Figure *E* of an arrangement of a portion of an asylum for chronic and working patients. In this block of buildings there are three entrances from the main corridor of the

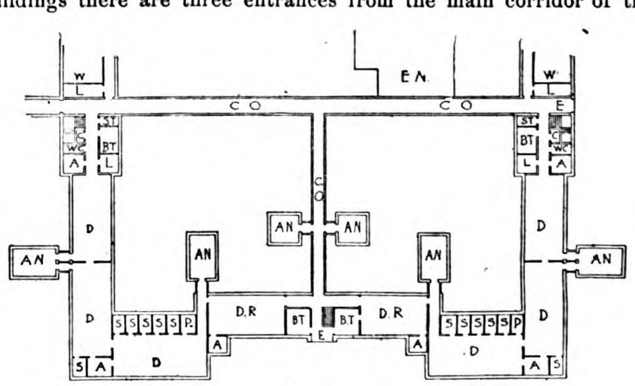


Fig. E.

A. Attendant.
AN. Annex. (Lavatories and W. C's.)
C. Coals.
CO. Corridor.
D. Day-room.
DR. Dining room.
E. Entrance.
EN. Engine-room.
L. Lavatory.
P. Padded-room.
ST. Stores.
S. Single rooms.
W. Workshops.

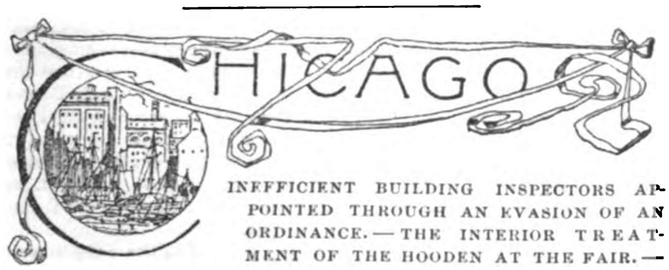
asylum and three entrances from the airing-court, which in a case like this might conveniently be divided into two or three parts, so as to secure some outdoor separation and classification of the patients liable to quarrel or undesirable as companions to one another. Near each of the entrances, it will be seen, there is a boot-room: these and the attendants' rooms are very conveniently arranged near to

the outer doors, thus affording every facility to the attendant to keep an eye upon patients both in the grounds and in the buildings; other and intermediate attendants' rooms are provided, as also a number of single rooms, the water-closet and lavatory accommodation is divided, so that patients need not pass through other day-room or dormitory than the one they are warded in. The patients who are either able or can be persuaded to work would be placed on the eastern side near the workshops and entrance to the farm land.

In Colney Hatch Asylum, where the average number of patients in 1891, was 2,250, we learn that forty-seven per cent of the male and fifty-nine per cent of the female patients were induced to employ themselves in one way or another, and these figures when compared with many asylums are not looked upon as high. The providing of work and exercise for the patients must be looked upon as a matter of the utmost importance. To turn the inmates out like criminals or wild beasts into the airing-court, is a practice by no means calculated to assist their mental recovery, to improve their habits or give them any contentment. The staff of attendants and nurses is not only required for supervision and safe custody, but to promote employment and amusement, especially encouraging outdoors work and exercise. In all cases, the architectural arrangements must be such as to facilitate the action of the medical officers and others in their endeavors to provide occupation for the patients under their care who may prove to be capable of it. It is strange that lunatics from town districts are often more excitable than those from agricultural localities.

In our next paper we purpose considering the arrangements of the administrative block which in most asylums forms the centre, with the males on one side and the females on the other.

(To be continued.)



INEFFICIENT BUILDING INSPECTORS APPOINTED THROUGH AN EVASION OF AN ORDINANCE. — THE INTERIOR TREATMENT OF THE HOODEN AT THE FAIR. — A DUTCH INTERIOR. — FURNITURE.

AS previously mentioned in these letters, the City of Chicago had nearly adopted a new building ordinance one of whose provisions was the appointment of the building inspectors by competitive examination. This was to take place before a board composed of the Commissioner of Buildings and four other members, one each from the Illinois Chapter of the American Institute of Architects, the Board of Chicago Underwriters, the Builders' and Traders' Exchange and the Carpenters' Council, each appointed by his own organization.

This was the first attempt to introduce into our municipal offices the principles of civil service and the issue was promptly met by the politicians of the City-hall, who appreciated that it was an entering wedge for a possible future extension of that most pernicious system, based upon the capability of a man, and not upon his "pull." Accordingly when in the month of May this board duly met at the City-hall no over-eager and friendly coöperation was visible from the powers that be. Apparently the Building Commissioner himself, appreciating the fact that all the defects and deficiencies of the entire office would be laid to him, desired good and capable men. Especially had he reason to do so, as the last incumbent of the position was the object of repeated attacks, both from the press and from coroners' juries, because of the utter incapacity and rottenness of that office. But the pressure of "infloonce" was mighty and however willing the spirit, the flesh was certainly weak.

It was quickly discovered that, whatever the capabilities of parties, the general and indiscriminate applicant was certainly not allowed to appear before the board. Only those who had sufficient influence to make it desirable for the mayor to put his name on the list were allowed in the hallowed precincts of the examining room. Notwithstanding that members of the board received no pay whatever and were frequently obliged to grievously neglect their own business, they went into the work most seriously and conscientiously that there might be no mistake in judgment. The most unpromising candidates were allowed time to attempt to answer ten questions, when generally each member felt that the candidate's ignorance was fully demonstrated in three answers. As the result of a prolonged series of most tiresome sittings, nearly eighty applicants were examined, of whom only twelve were deemed of sufficient capability — although the requirements were not high — to be recommended to the board. From this, the general calibre of the candidates can easily be imagined. Of this number, however, only four were appointed!!!

The meetings of the board were not terminated by regular adjournment agreed upon among its own members, but by order of the Commissioner. The demagogues, seeing that by any such series of examinations they were sure to lose all chances of supplying places to their friends, took another tack. They secured the passage of an "order of council" (which can never supersede an ordinance) directing the Commissioner to appoint such parties as passed the examinations to *his* satisfaction. Armed with this authority, appointments were at once made, and as a result several saloon-keepers, a number of ignorant so-called mechanics, and four really capable men now constitute our efficient (?) Board of Building Inspectors.

Although the true state of affairs was known, yet no one appeared particularly interested to investigate, until the Board of Underwriters threatened to advance their rates in this city owing to the incapacity of the inspectors of the Building Department. This stirred up considerable talk and numerous newspaper articles for a few days, but without any appreciable result except a statement from the Building Commissioner that the board had paid no attention to him, and he did not feel bound by its action. Here it appeared that the matter would probably rest as it seemed to be no one's especial business to get into a legal fight with the city government. However, a committee of the Builders' and Traders' Exchange has now taken the matter under consideration and it is to be hoped will find some way to effectually force the issue.

A feature at the World's Fair most interesting to architects and architectural students, is the study of interiors that can be made in different places. Some of these are most carefully studied and are quite historical, affording very charming opportunities for inspection and comparison. In one of the previous letters from Chicago there was mentioned the Hooden or Phœnix Palace erected by the Japanese government on the Wooded Island. The descriptions that were given us before the actual work was begun promised much of interest, but did not in any way exaggerate the attractions of the actual display. The palace consists of three pavilions, each one representing a special epoch in Japanese decorative art. The most southern pavilion represents rooms in a shogun's villa about the middle of the fifteenth century. These rooms are especially charming and curiously enough lack all touches of brilliant color which are so distinctly associated in our minds with Japan. In fact the entire decoration of the rooms is in black and white. The floor has the ever-present Japanese matting, each breadth being bound with a white and blue material, the matting itself being made over a padded frame, so that the whole thing can be lifted from the floor in sections. The walls are covered with canvas, the canvas being painted a dead white. The frames of the sliding screens and windows are black lacquer, while the ceiling and heavier woodwork of the room is of white cedar. The treatment of the wood, as frequently noted by travellers, is especially attractive, being apparently without finish in one sense of the word, as signifying either varnish, shellac, etc., but presents the smoothest and softest of surfaces, while no bit of the natural grain is lost. The design of the woodwork like all the rest of the work in the rooms is of extreme simplicity, absolutely no carving or moulding being present: only an occasional gilt chrysanthemum serves as decoration. The ceiling is made of what are seemingly twelve-inch boards, overlapping after the manner of shingles, while beams run at right angles to them. The white walls are relieved by an occasional bit of decoration in monotone, a flight of swallows executed in the most dainty of Japanese impressionist manner or an occasional palm tree. Built into the room are several small recessed cabinets, while above these are little sliding doors of white with the black and gray decoration. Two kakemonos hang on the wall and the whole room though severely simple is extremely attractive.

The central pavilion of the Hooden represents three rooms in a palace of a daimio, at about the middle of the eighteenth century. This style we are told is that of the golden days of the Tokugau and the golden past can be accepted without question. The extreme of ornamentation, farthest removed from the simplicity of the first pavilion, is here reached, the decoration being most elaborate both in color and design. The central room of the three is evidently the room-of-state in the house of the noble, while the room to the left across a passage is apparently the dining-room, gorgeous in service of red and gold lacquer. The ground-color of all the walls is of dull gold, the two smaller rooms having a fan decoration which is not at all satisfactory. The colors of the fans are of the strongest and most intense kind. The decoration of the central room consists of different panels, of the most impressionist kind of Japanese landscape. The central and largest one stands forth strong and fine, a gnarled pine-tree tossed by the winds, while waves swirl around its base. Most of the panels are of the lightest and brightest description. Colored jars and pots stand around, one containing a stunted cedar, another a cherry-tree in full bloom. The floor is covered with the same straw matting and the woodwork is still of the white cedar. The applied gilt decoration is no longer simple, but elaborate, while above the openings are placed screens of wood carved most profusely, carving resting on carving and colors running riot. The ceilings are divided into squares by bands of lacquer, while within each panel rests a cock, conventionalized almost beyond recognition, but of the proudest and bravest hues. The effect of the whole apartment, especially when filled with the gay dresses of the Orientals must have been gorgeous in the extreme and very beautiful.

The third pavilion is of the earliest style of the thirteenth century and here the chief characteristic seems to be the use of the pure primary colors, placed side by side, with utter fearlessness. Little or no lacquer is used in the room, and the woodwork is extremely simple, but the whole wall-space is covered with the brightest of ornamentation apparently stencilled on, in which a prominent feature is horizontal bands of blue, dashed with white crossing through the

designs at frequent intervals. The raised matting mats only partially cover the floor, the kakemono does not appear either on the wall or lying rolled, as in the other pavilions, and the screens, of which there is an unusual number, are curious movable silk curtains hung on lacquer bars. The window-screens are of a sort of bamboo matting, which roll up and tie with huge tassels of the brightest red dye.

It is very curious to notice how in these examples of three art epochs of Japan the same spirit seems in a measure to prevail, as was shown in the European epochs which somewhat correspond to them in time. First we have the thirteenth-century work, the chief characteristic of which seems to be the use of the pure primary colors. Though this was not by any means the only characteristic of Romanesque decoration, still it was a very strong one, strong enough indeed to make the similarity between the Occidental and Oriental work quite striking.

In the middle of the fourteen hundreds Japan apparently enjoyed severe simplicity in her decoration, while Europe with the advent of the Renaissance found her things of beauty in the simplicity suggested by antique forms. In the eighteenth century Japan ran riot in golds and elaborate designs in her decoration, while Europe was covering herself with rococo elaborations. That these similarities can be more than coincidences it is difficult to understand, but the curious fact of the resemblance certainly exists for those who give the matter thought. The work of the fifteenth century corresponds to what is our usual preconceived id a of Japanese decoration, while the other two epochs are surprises. These pavilions afford very delightful examples of interior study and decoration, and are well worth careful inspection.

Standing apart by itself, as they do, though not in their immediate neighborhood, is a very excellent example of an old Dutch house. This exhibit has not for its chief object the displaying of the old Dutch style of furniture, being in itself actually the setting for the exhibition of the Van Houten Cocoa people. The whole thing is most excellently carried out, however. Being built of wood, outside it is only a poor imitation of a steep-roofed, ordinary Dutch brick house, but inside everything is certainly most picturesquely arranged. On the northern side of the entrance one long room of modern workmanship, but quite in the spirit of the old Dutch style, is used for the serving of cocoa, but on the southern side two smaller rooms rich in the old Dutch carving and Delft china serve as a sort of museum. These are extremely well carried out and if all is not old within them, it is, at least, an excellent reproduction of the old. A wainscoting of Delft tiles harmonizes with blackened woodwork, and the windows throughout the building are of pale olive-green glass in leaded panes. The only color of the serving-room is the olive-green, relieved by the bright blues of the Delft china, which is introduced wherever it can be used. The whole picturesque interior is increased by the costumes of the serving-girls, who wear the curious coiffures of the different districts of Holland. The entire picture is carried out.

In the Building of the Liberal Arts the furniture displays of the different nations are extremely interesting, and are so placed as to often make very good interior studies, full of national characteristics. The furniture of our own nation has less characteristic setting and the display itself is not a very general one. Quite aside, however, from any feeling of national pride, which it goes without saying, intelligent people leave at home when they visit a World's Fair, our furniture stands out most distinctly as combining in the highest degree excellence of design and workmanship, with a general character of comfort and ease. We have, it is true, had no Morris nor Eastlake nor Chippendale, the names of our designers are unknown to the general public, but most certainly many of the good qualities of our work seem to be the good qualities inspired by many and different nations, till a truly admirable style has been the result. The marquetry work done by some of the Grand Rapids manufacturers is really charming and it is only to be regretted that more of the Eastern firms have not thought fit to send some of their good work, making the exhibit more general and thorough.

The furniture of that nation which in grace and elegance stands farthest from us is that of Germany, if we take as typical their modern furnishings, than which nothing could be worse. The forms of the gilded furniture which attempts to assume the French characteristics are extremely awkward and are only equalled by the very bad coloring. Two especially hideous examples of modern German work are two chairs which are proudly labelled, "For the new palace at Potsdam." That anything could be more inartistic it would be hard to imagine, unless we except some of the very painful portraits, in bronze, marble and paint, of the young Emperor, whose face would certainly need a master to idealize it into refinement, at the best.

In this modern style nothing that is simple can appear beautiful to the German eye. There are two large rooms in the German exhibit, one furnished to suit the most approved nineteenth-century taste in all the abomination of gilt and stuffy elegance, while the sixteenth-century room possesses many features that are charming. In the modern German room where the most elaborate display is made, bad forms vie with bad colors for the mastery and stuffy elaborateness of hanging and upholstery with atrocities in gilded and painted woodwork. The Germans, like the French and Austrians, occasionally paint decorative figures and scenes on their woods, producing an almost papier-maché effect whose good taste is always questionable. When, however, the work is as poorly executed as on some of the German furniture, the question is promptly answered.

Quite distinct from this modern school of German furniture and furnishings which appears to have for its secret, perhaps unconscious, inspiration, the models of France, there is the style which keeps to the simple forms of the old German times, which is extremely good. It is in this kind of furniture that we get that excellent treatment of wood-finish, before spoken of, and the unaffected furnishings of rooms whose simplicity and truthfulness is their great charm. One entirely delightful example of this kind of work comes from Simon Schneller, in the form of an old German dining and hunting room. The chief features of the rooms are German Gothic, with here and there a little touch of Renaissance carving introduced. The colors used in the room are green and burnt-sienna, the whole thing at first appearing so simple that it hardly seems designed. The frieze around the room is a conventionalized hunting-scene in greens and browns. A settle of very good design has above it, really being part of itself, a cabinet, behind whose faded green silk curtains old books peep out, while above, coarse pottery and old pewter tankards are arranged. The chairs are covered with brown leather and the design of them is good, while the tall clock has Gothic features about it. Next to this hunting-room is a very pretty Gothic room from some Nuremburg firm. There are several pleasing features about this exhibit which are well worth especial study.

Next to the Germans in the march of improvement stand the Austrians. Their chief furniture exhibit that has any attempt at artistic setting is the reproduction of the *salon* of the Princess Metternich. Here a little of the grace displayed by the French appears, and the colors themselves are at least harmonious. In this especial room the ceiling is fairly well frescoed, while the unpainted portions are creamy white, with gilt rococo tracery. This cream-and-gilt treatment is also used on the walls to frame-in tapestries. The furniture is all gilded or lacquered, even the grand piano having a case painted in the papier-maché style. Satin draperies are hung wherever possible, and the entire room is bristling with upholsterer's art. This would naturally be expected in a manner in an exhibit of this kind, but that it is boldly placarded a reproduction of the Princess Metternich's room, leads one to trust a little in the faithfulness of the reproduction. There is absolutely no repose about it, and neither in part or as a whole would it serve as a background for any fine work of art that might be placed in it.

The gilt and lacquered style we see perfected in the French work. Of its kind it is truly excellent. If the French make a gilded chair that is neither comfortable nor useful, you can at least be sure of one thing, that it will be the best thing of its kind made; that the design will be good; in fact that it will have, as an enthusiastic auctioneer said the other day of an old Dutch chair, "chaste extremities." The French have some very dainty bedroom furniture, forming with the bedrooms themselves a very pretty exhibit.

The display in the shape of a well-studied room of the twelfth-century style in the Danish pavilion has already been mentioned, and should not be missed, when a special study of the furniture of the Fair is being made.

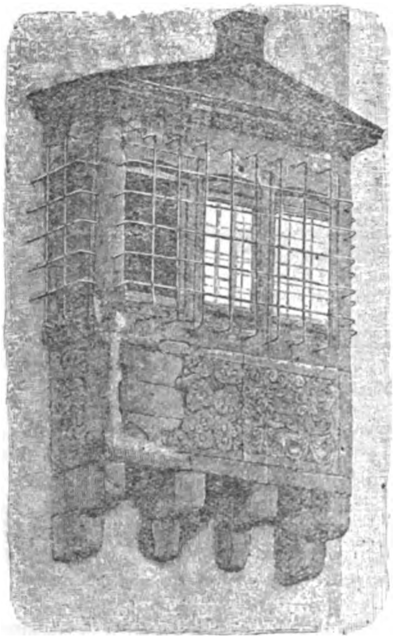
England's furniture display is very interesting, though resembling that of the United States, in that it is chiefly a display of furniture, rather than any attempt at interior studies. This furniture is perhaps more formal and has less of generous comfort about it than our own, while it excels ours neither in design nor workmanship. There are in this exhibit some very beautiful specimens of marquetry and inlaid work, and some most charming and interesting Chippendale furniture. This is especially worth careful inspection by people who are making designs in this direction a specialty, as these are reproductions either of specimens in private collections or in the South Kensington Museum. A very attractive bookcase is from the latter place, while a clock, tables, desk and chairs are from private collections. An entire exhibit is made of mediæval carved-oak furniture, which, however, has almost too little study of design to be entirely satisfactory.

The most attractive display in England's furniture exhibit is made in the Hampton & Son's reproduction of the banqueting-hall at Hatfield [see the *American Architect* for August 26], the country-seat of the Marquis of Salisbury. This reproduction is most excellent in all particulars. The room is two-thirds the size of the original, being forty feet in length. This display becomes one of unusual interest, as the original hall is one of the best examples of pure Elizabethan style. One of the special features of the room is the flat ceiling, which here shows its commencement for large halls of this character, all previous ones having gabled, heavily-timbered roofs. At one end of the room a minstrels' gallery extends across the entire length, while the opposite end is covered with a carved-oak screen. By permission of the owner of Hatfield, it is said, plaster models were made of the carvings, etc., by the exhibitors, so that the reproduction is very reliable. All the details of the room are most carefully carried out, and well worth study. A large, open fireplace is in the centre of the room, with all its appointments, while above it hangs an old tapestry. Another firm uses the room as a setting for reproductions of Elizabethan plate. This may be fine, but it is a little difficult to judge of them placed as they are, where the visitor can only view them from behind the railing anywhere from ten to twenty feet away. This exclusiveness on the part

of the English exhibitors is very absurd. Examples of the silver and gold smith's art are usually expected to require close inspection, but in several exhibits in the English section this desire for privacy makes a farce of the whole display.

Italy has some very excellent furniture, though not placed to afford studies of interiors. Of the carved woodwork, that of this country takes a high rank, and most certainly stands alone in its unique character. The carving is treated in as realistic a manner as are the works of the actual sculptors of Italy, but, by its excellence of execution, offers charming results. Besides the carved furniture, there are many good examples of inlaid work, and specimens where leather work is successfully introduced. A certain picturesqueness seems to attract one in this display, but few are the traces of ease and comfort, so essential to the English and Americans, found in this furniture of Italy.

SOME EXPERIMENTS ON CONCRETE BEAMS.



Oriel at Schloss Offenbach.

THE title of a paper in Vol. CXI of the "*Proceedings of the Institution of Civil Engineers*" (1892-3, Part I), caused us to turn to it with considerable interest, says the *Builder*. The title runs:— "Strength of Concrete Slabs," by Sidney Richard Lowcock, Assoc. M. Inst. C. E. We trusted to find that, at last, some valuable experiments had been made which might furnish data for the construction of concrete floors. The experiments of Colonel Seddon[1] on concrete slabs, supported on all the four sides and uniformly loaded until they broke, were in the right direction, but further experiments on other kinds of concrete, and more especially on slabs *fixed* on all the sides, were needed, so that more accurate constants might be deduced. Our hopes that Mr. Lowcock's paper would disclose the results of such experiments were speedily overthrown, for the "concrete slabs" were neither more nor less than beams, supported at the two opposite ends and loaded in the middle. As far as they go, the tests are useful; we cannot but regret, however, that they did not go further, and, if Mr. Lowcock will continue them in the direction indicated by the title of his paper, he will confer a benefit on architects and engineers alike.

A brief *résumé* of the experiments will be of interest. The slabs, or, rather, beams, were made with good Portland cement (which had a tensile strength of 665 pounds per square inch at seven days), and "clinker obtained from furnaces which burned ash-pit refuse." The clinker was crushed in an ordinary mortar-mill, and was afterwards passed through a screen with three-fourths-inch meshes, and thoroughly washed with clean water. Unless the washing was carefully done, it was found that the concrete "swelled and blew after setting." Three different proportions were adopted, namely: (A) 1 part cement to $4\frac{1}{2}$ parts clinker; (B) 1 part cement to 6 parts clinker; and (C) 1 part cement to 6 parts clinker as above, and 2 parts clinker ground to the fineness of coarse sand. The concrete was well rammed into greased wooden moulds. Slabs of three different sizes were made of each mixture, namely, 21 in. × 18 in. × 4 in., 30 in. × 18 in. × 6 in., and 39 in. × 18 in. × 9 in.; they were kept dry until tested. The supports for the different-sized slabs were 12, 18 and 27 inches apart respectively.

If we base our calculations on the formula $W = \frac{2}{3} C \frac{B\,D^2}{L}$

(where W and C are in hundredweights, and B. D and L in inches), we can find the value of C for the different mixtures. For concrete (A) — proportion 1 to $4\frac{1}{2}$ — $C = 1.9$[2] at the age of fifteen days, and 2.8[3] at the age of twenty-one days; for concrete (B) — proportion 1 to 6 — $C = 1.2$[4] at the age of fourteen days, and only 1.1[5] at the age of twenty-one days; for concrete (C) — proportion 1 to 8 — $C = 0.3$[6] at the age of fourteen days, and 0.4[7] at the age of twenty-one days.

The individual beams in the last two series vary considerably, some being twice as strong as others, and, as the total number of "slabs" of these series was only fifteen, of which four were damaged prior to testing, the "constants" deduced are not very reliable. Indeed, all the tests were carried out at too early dates. The single beam of the 8 to 1 concrete, which was tested at the age of fourteen days, was "not dry through," and, consequently, not in a fit state for being broken. In the other cases, also, more uniform and more valuable results would have been obtained if the beams had been a little older. But the tests will have the effect of drawing further attention to the importance of keeping the supports of concrete floors in position for as many weeks as possible, more especially when the proportion of cement to aggregate is small. They also corroborate previous experiments, which have shown the unsuitability of concrete, when used alone, for resisting transverse stresses, for the beams tested by Mr. Lowcock yielded suddenly and totally, no sign of fracture, except in one instance, appearing before the collapse.

It must be borne in mind, however, that the beams were merely *supported* at the ends. Had they been *fixed*, the probability is that the lower surfaces would have cracked long before the beams actually collapsed. In other words, the concrete would have formed itself into a kind of arch, part of it opposing a compressive resistance to the stress of the load, and part of it (underneath) being at the same time cracked, and, consequently, worse than useless. It is this behavior of fixed concrete beams and slabs which renders it impossible to calculate their strengths from constants deduced from experiments on beams and slabs which have been merely supported. We hope that the next gentleman who tests concrete beams and slabs will see to it that some of them have their ends and edges securely fixed. In this way only can a rule be formulated which shall foretell the strength of other beams and slabs with an approximation to accuracy.

On the whole, Mr. Lowcock's tests give somewhat low results, but this is due to the early dates at which the tests were made, and, perhaps, partly to the nature of the aggregate. A beam composed of equal volumes of Portland cement and coke breeze, and tested in 1891 by Mr. David Kirkaldy, yielded a constant of 5.9, although the beam was only seven days old; while a much larger beam, composed of one part Portland cement and four parts clean breeze, and tested by Colonel Crozier, yielded a constant of no less than 4.1, but the age of the beam was forty-three days. As the strength of Portland cement varies pretty nearly as the cube root of its age (within reasonable limits, of course), a beam similar to that tested by Colonel Crozier might be expected to furnish a constant of 3.3 at the age of twenty-one days, or 17 per cent in excess of the average obtained by Mr. Lowcock for beams of slightly inferior composition, but only six per cent in excess of the strongest beam of similar composition tested by him. The twenty-one days' tests of the $4\frac{1}{2}$ to 1 concrete are, therefore, remarkably similar to Colonel Crozier's test, but the results of the experiments on the two weakest concretes are not sufficiently regular to be of much use. This really does not matter much, as coke-breeze concrete weaker than 1 to 4 or 5 is seldom used where it will be subject to transverse stress.

It may be added that the weight per cubic foot of the $4\frac{1}{2}$ to 1 concrete was 118 pounds, and the compressive strength, at the age of fifteen days, was 1,120 pounds per square inch.

In the same volume of "*Proceedings*," four papers on graving-docks are printed, together with the discussion and correspondence which followed the reading of the papers. Some interesting information on concrete is given, but to this we merely allude in passing. A few words of Sir Benjamin Baker on theoretical investigations of strength may, however, be quoted, as they have a special significance when spoken by an engineer who must have had recourse very largely to such investigations. After referring to the strength of concrete beams, he said: "Bearing upon the general question of the value of theoretical investigations of strength, in cases such as a flat concrete invert, as compared with direct practical experience, I may say that several cases recently have made me a little nervous as to whether the results of the high technical training of the present day with many young engineers do not lead to a dangerous confidence in theoretical deductions and the use of formulas. No one can charge me with contempt of theory; but cases have been brought under my notice rather frequently of late showing too great confidence on the part of young engineers in theoretical deductions, in preference to going to the same extent as their predecessors had been in the habit of doing to previous examples, in order to see what was the right proportion to adopt in a particular work." And again: "Theoretical knowledge is no substitute for the practical experience upon which our predecessors in this institution have chiefly relied."

Certainly it sounds somewhat strange to hear a master of theoretical investigations (for the designer of the Forth Bridge cannot have been otherwise) discounting such investigations in this way, but there can be no doubt that his words are words of wisdom, and are especially to be pondered in connection with calculations of the strength of concrete beams. For the ordinary rules, which give the strength of fixed beams as double that of beams simply supported at the ends, do not apply to concrete. Fixing the ends of a concrete beam may treble or even quadruple its strength, while, instead of yielding without previous fracture, the under side of such a beam may crack long before the upper surface yields. From this, it is

[1] See the *Builder* for December 17, 1 92, page 482.
[2] Average of three tests.
[3] Average of three tests.
[4] Average of three tests.
[5] Average of two tests.
[6] One test only.
[7] Average of three tests.

clear that a concrete beam with fixed ends is, to all intents and purposes, an arch, and theory has not yet, on account of the paucity of experiments, formulated a rule for calculating the strength of such an arch.

Sir Benjamin, however, does not contemn theory; he would merely have it conformable to right practice, as it ought to be.

LEGEND OF ST. GUDULE.

LOOKING only to the picturesque and quaint side of the Middle Ages, as typified in Gothic arches, corbels carved grotesque and grim, stained windows, old turreted walls and pretty old-world costumes, we are apt to think of the mediæval times as a lesser golden age, a time of milk-maids and musical shepherds and sucking doves. But every now and then, as when the wind shifts the sand on some road through the Sahara, the skeleton of a man turns up to remind us that there was grim reality in those old days, too, and cruel suffering, and wild, mad hate. Then as our imaginations are touched in this new direction, we come, as in the museum of Brussels, on some sharp-spiked iron mace or three-pronged spear, or oftener some strange instrument of torture, a mere curiosity of mechanical ignorance, perhaps, to us to-day, but a very terrible reality to the condemned victim who entered the torture-chamber and saw the massive bolts and chains ready to crush the life out of him or tear him asunder; a very terrible reality to him, we may be sure, a few minutes later, when, already stripped and chained on the iron frame, he felt the first keen, wild throb of pain from twisted spike or red-hot iron pincers, that told that the frightful work was begun which, after dragging on for hours that seemed ages, was to hurl him screaming through the gates of death.

Yes, under the fair outward covering of dainty shepherdesses and sucking doves, which represent to us the Middle Ages, when people were "goodly knaves" and wore "leather jerkins," there lurks an element of grim tragedy as dark as anything that our struggle-for-life century can show.

The Middle Ages are a type of the world in this. Like some fair Corsican valley which to the mystery is full of nature's calm beauty hidden under a purple mist, while in the hearts of the peasantry are the seeds of ravishment and murder and revenge, so the Middle Ages. The purple mist of time has hidden from us their harsher features; calmed their wild, shrieking pain in death, and turned the terrible torture-chamber into a mere museum of curiosities, in which we while away an idle hour of a summer holiday.

And there is much more in Brussels to remind one of those by-gone days, before the Genoese navigator sailed westward from the blue shores of Portugal. Most notable of these relics of the past is the old Cathedral Church of Saint Gudule, with its ancient Gothic arches, weather-beaten and time-stained, its ghoul-like monsters and hideous dragons carved in stone at the end of every water-spout, and inside its quiet, old-world atmosphere, laden with the dust of ages, and watched over by the innumerable dead whose bones lie close-packed beneath the flagstones.

Most curious among the antiquities of the old Cathedral of St. Gudule is the mechanical clock, now rusty and time-stricken, but once a very marvel of ingenuity. The clock was like a church in miniature, with its big doorway and pointed spire, on the top of which rested a golden angel, whose trumpet sounded to mark the hour. The angel Gabriel, standing on the left of the clock-tower, waved a lily branch, as if to salute the Virgin standing on the other side. Then the doors of two niches opened and showed two skulls, in front of which lay little books whose pages turned of themselves, showing a different text for every hour of the day. Then the silver bells in the clock-tower used to sound a sweet, melancholy chime, and on a little stage was acted all the drama of the Passion, from the treacherous kiss of Judas to the last moments of the crucifixion. The angel sounded his trumpet once more and then all became silent and immovable as before.

Many years ago, they say, a prince came to lay siege to the city, but, in spite of all his armies, in spite of the great wooden towers that showered down mighty stones, and arrows and flaming torches, his efforts availed him nothing. A miraculous cloud spread round the walls, like a second rampart; the Holy Virgin and the angels appeared in the middle of the cloud and hurled back the stones and arrows and flaming torches amongst the assailants, many of whom were slain. The prince of the hostile army, furious at this miraculous protection, blasphemed horribly against the Divine guardian of the town. He was stricken stone-blind. Then he bowed beneath the hand that had chastened him, raised the siege and promised to present to the Church of the Virgin a crown of gold in which his horse could turn round.

His repentance found favor with the Mother of the Lord, his eyes were opened again, his sight was restored and he visited the Church of the Virgin with a yellow taper in his hand, to offer thanksgiving for his recovery. The prince, full of joy, declared that he would offer to the Church another gift as wonderful as the first was rich.

At these words a young shepherd from Rome came forth and said: "I will make it; give me a thousand golden crown-pieces and hire me for fourteen years and I will make you a clock of which the fame will go abroad, like the fame of the seven wonders of the world." He received the thousand crowns of gold and toiled day and night for fourteen years and completed the beautiful clock, modelled like a miniature church, with a golden angel on the spire.

"Now," said he to the bishop, "I must return home to my poor, good mother, whom I have not kissed for over fourteen years. I have shut within this stick the thousand pieces of gold which I have received in payment. God and the Blessed Virgin be praised! If they protect me on my way I shall be able to bring enough to my good mother to raise her beyond all fear of misery, to the end of her days."

But the bishop was one who feared not God, neither regarded man. He said to himself: "The shepherd will go away to other lands; he will make, perhaps, another clock, more wonderful than this; our clock will lose its renown, to say nothing of the pilgrims who will no longer come to this city to wonder at a unique work of art." He tried, therefore, to persuade the skilful shepherd to stay; but to each brilliant promise the young man replied, "All this is not worth my poor, good mother."

"But I shall send to bring her here," replied the bishop.

"Oh, no," said the youth; "she would die beneath your damp and chilly sky. My mother lives in the beautiful city of Rome; and even if she could bear the fatigue of such a journey, would she consent to leave the city of the Pope, the Pope whose mere passage through the streets is worth an indulgence to her?"

Then the bishop wished to arrest the shepherd as a sorcerer and a heretic, but feared to see the citizens rise in revolt against such an unworthy act. He had the shepherd waylaid just outside the town by ruffians without faith or mercy; the youth defended himself bravely, and they only succeeded in seizing his stick which contained the thousand pieces of gold.

"I have become poor again," he cried, after escaping from their ferocious hands, "but I still have my fingers and my eyes, and I shall be able to gain a thousand golden crowns once more."

The evil bishop, to whom this speech of the shepherd was reported, then made a resolve which must have been inspired by the devil in person. He had the shepherd's eyes put out with a red-hot iron and lopped off the fingers of both hands.

The poor young shepherd died many years after, wandering through the streets of the city, and begging his bread from door to door. He never saw the holy city of Rome, nor his poor, good mother.

Thus runs the legend. Here a mere broken relic of past days, a curious old clock, that can no more tick out the seconds and chime the hours, but has become mere gazing stock for idle passers-by, can still click out its cruel tale and chime out its testimony to the tragedy of mediæval life. — *Charles Johnston, in the Providence Journal.*

ST. GERMER-DE-FLY, OISE.

WE had driven out a dozen miles or so from Beauvais to see the old abbey church of St. Germer-de-Fly, and had found ourselves in a quiet country village, with one long street containing most of its houses, great and comfortable-looking buildings of brick and stucco. Many of the houses have delightful gardens around them, filled with roses in full bloom, and with fruit-trees carefully trained against the walls. In the middle of the village stands the old church, like a stranded bit of the Middle Ages, a noble and interesting building of the twelfth century, with a paved court-yard in front of it which one enters through an archway. We had spent an hour in examining the church, when the old French woman in charge opened the door of the chapel connected with it and ushered us in. It was a surprise to come into so beautiful a building in a small, quiet town, the very mate of the famous Sainte Chapelle in Paris, only not restored with vivid color as that is, but pure and pale in tone, and with wonderful blues and reds in the old glass glowing in some of the windows. And when our old woman opened a little door directly into a fine park, and invited us to walk in it, we became captives to the charms of the place. It was impossible to leave it after an hour, and a tiny hotel being pointed out to us, we decided to return in a few days to enjoy it at our leisure. And here we find ourselves living in so small an establishment that a party of four quite exhausts its resources, with a very sweet-tempered madame to cook and wait upon us, and monsieur in his blue blouse to drive us about the country with his strong white Percheron horse. There is a tradition of one American, and one only, who once came here, though Englishmen come from time to time.

The roofs of the cottages and other buildings are a study in themselves. In this part of France they are mostly covered with a deep purplish-red tile, though thatch is sometimes to be seen. Time has mellowed this color with shades of gray-brown, and an occasional dash of orange and moss and lichens have added to the variety of tint. The curves and deflections that settling has produced add another charm to the original fine form of the roofs, with their great variety of chimney and dormer. Their color is much more rich and harmonious than that of the somewhat crude orange-red tile that is seen in certain parts of England — in Lincolnshire, for example.

The great church stands in the centre of the village life, a fine building of more than seven hundred years old, a good deal whitewashed inside, but retaining much interest apart from its associations with the monks who lived here for centuries. They disappeared long since, and their lands were bought and a fine château built on them. The long pond in the park is pointed out as having formerly belonged to the abbey, but only a few ruins remain of the monastic establishment. The grounds are laid out as a park, with

long walks bordered on either side by ivy-grown trees, high walls enclosing the whole place, to which the gates stand always hospitably open. The beautiful chapel has escaped much restoration, and its carvings and capitals, instead of being whitewashed, retain traces of their original colors, the leaves on the capitals being often a soft green. On the floor are some flat tombstones with incised figures of former abbots, beautiful examples of very early work, which have been carefully protected from the feet of passers-by.

The church and chapel are a delight to the eyes at all times, but most so, I think, in the long twilights of these summer days, when the light fades and the details of the buildings become less distinct. Sometimes a great owl comes out from his hiding-place and flies about, calling to his mate, who answers him from her hidden nest. Bats circle about and beautiful blue swallows fly low down, close to the ground. The golden color in the west makes a wonderful background to the old abbey, and the gargoyles and pinnacles turn into dark silhouettes against the glowing yellow. The peace and quiet of the place are great, for only a few voices, softened by the distance, come to our ears. — *Correspondence of the New York Evening Post.*

ILLUSTRATIONS

[*Contributors are requested to send with their drawings, plans and a full and adequate description of the buildings, including a statement of cost.*]

HOWARD MEMORIAL LIBRARY, NEW ORLEANS, LA. MESSRS. SHEPLEY, RUTAN & COOLIDGE, ARCHITECTS, BOSTON, MASS.

[Gelatine Print, issued with the International and Imperial Editions only.]

THIS view, unfortunately, has a certain air of unreality since it is obtained by making use of a reversed negative.

CHRIST CHURCH CATHEDRAL, VICTORIA, B. C. MESSRS. EVERS & KEITH, ARCHITECTS, SEATTLE, WASH.

THIS competition, which was practically an English one, was decided last year. Several English architects competed and all the designs were placed in the hands of Sir Arthur Blomfield as expert, who selected the design by Evers & Keith, of Seattle, Wash. and Victoria, B. C.; the second and third places being awarded to London architects. The building is to be entirely of stone with stone spire, copper *flèche* and slate roof, and the principal dimensions are: total length, 236 feet; width, 125 feet; heighth to ceiling of nave, 72 feet; heighth to ridge, 90 feet, and heighth of tower and spire, 270 feet. When complete, the cathedral will have cost about $250,000.

HOUSE OF A. J. PARKER, ESQ., TORONTO, CAN. MESSRS. DICK & WICKSON, ARCHITECTS, TORONTO, CAN.

OLD HOUSES AT ST. LO, NORMANDY, FRANCE.

[Additional Illustrations in the International Edition.]

STATUE OF THE REPUBLIC, WORLD'S COLUMBIAN EXHIBITION, CHICAGO, ILL., MR. DANIEL C. FRENCH, SCULPTOR. THE PERISTYLE, WORLD'S COLUMBIAN EXHIBITION, CHICAGO, ILL., MR. C. B. ATWOOD, ARCHITECT. THE AGRICULTURAL BUILDING FROM THE NORTHWEST, WORLD'S COLUMBIAN EXHIBITION, CHICAGO, ILL., MESSRS. MCKIM, MEAD & WHITE, ARCHITECTS.

[Gelatine Print.]

NEUES THEATER, LEIPSIC, SAXONY. HERR C. F. LANGHAUS, ARCHITECT.

[Gelatine Print.]

ST. GILES' CHURCH, CAMBERWELL, ENG.: RESTORATION OF TOWER AND SPIRE.

THE views of the Church of St. Giles, Camberwell, which we publish this week, are from photographs taken before and after the restoration. It will be remembered that early last year the structure was found to be in a dangerous state, and was condemned by the London County Council. The churchwardens and overseers having consulted and received a report from Messrs. Newman & Newman, architects, of Tooley Street, London Bridge, instructions were given to them to prepare necessary drawings for the restoration, which is being carried out, and has been completed to the point shown. The works have consisted of the renewal of the whole of the decayed Caen stone dressings, and the substitution of the best Portland for the same. All the original mouldings and carvings have been restored in the most careful and conservative manner, the upper thirty feet of the spire being taken down and rebuilt. The scaffolding which encircled the spire was 210 feet high, and was one of the finest pieces of scaffolding recently erected in London, and has formed a landmark in the district for the last twelve months. The works will have cost, when complete, £3,800.

YORK BUILDINGS, MANCHESTER, ENG. MESSRS. CHARLES CLEGG & SON, ARCHITECTS, MANCHESTER, ENG.

THE buildings shown in the illustration are situated in York Street and Mosley Street and were erected for the York Street Property Co. The premises are adapted for offices and chambers and warerooms on the upper floors, and for shops and offices on the ground-floor, whilst the basement was specially designed and arranged for the Mecca Café Company. The buildings are supplied with two passenger elevators and a goods hoist, with loading accommodation from back street, and are also fitted up with the electric light. The materials used in the elevation are Accrington plaster-bricks, with New Pillough stone dressings, the whole of the ground-floor elevation being of stone. The domes of turrets are of copper, and the roof is of the best Velinhelli slates. Among the advantages of the buildings are a subscription writing-room, with special postal and telephonic arrangements, as well as dressing-rooms. The building has been completed at a total cost of about £20,800.

STRASBOURG, AFTER A DRAWING BY SAMUEL PROUT.

COMMUNICATIONS

[*The editors cannot pay attention to demands of correspondents who forget to give their names and addresses as guaranty of good faith; nor do they hold themselves responsible for opinions expressed by their correspondents.*]

THE CHICAGO MANUAL TRAINING SCHOOL.

CHICAGO, ILL., August 22, 1893.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — I don't know who your Chicago correspondent is, but whoever he may be he ought to inform himself a little more before he compares the work of the Pratt Institute and that of the Chicago Manual Training School in such round terms.

The facts are, that the Pratt Institute employs a special instructor in architectural drawing, while the Chicago school does not, but the work has to be done by the instructor in machine drawing and at the same time in a class of from twenty-four to fifty, from five to eight only of whom are taking architectural drawing, and not only this, but the drawing time is only one hour a day.

Now if your correspondent or your editor can tell me how I can do two things at the same time, and do either or both successfully, I should be everlastingly obliged. I have been trying to find out for eight or nine years, but have not yet, so have done the best I could with from one hundred and fifty to one hundred and eighty boys daily, with no assistant. Yours respectfully,

The Perspective, Orthographic, Isometric, West Jean Design Machine, Architectural, etc., Instructor,

CHICAGO MANUAL TRAINING SCHOOL.

[While we hope that our correspondent receives a salary in proportion to his varied and numerous occupations, we cannot see why the work turned out by his scholars, which is evidently exhibited at Chicago on its own merits, may not properly be compared or contrasted with the work of the scholars of any similar institution. — EDS. AMERICAN ARCHITECT.]

OUR ILLUSTRATIONS OF THE WORLD'S FAIR.

CINCINNATI, O., August 23, 1893.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — I have been a weekly purchaser of the Imperial Edition of the *American Architect* for two or three years, and looked forward this year to a feast of good gelatine plates of the World's Fair buildings and sculptures. Early in the spring you advertised a thoroughly comprehensive treatment of the matter in illustrations, but, beyond a half-dozen plates, so far I have not found the promises fulfilled. Now the same meagreness of really good photographs of the Fair has been noticeable in other publications, particularly *Harper's Weekly*, and I am led to believe it is the fault of the Exposition management in not affording facilities, since the complaint against the official photographer is loud and continuous. If this is the case, wouldn't it be a good thing to say so, and let the attack be made general enough to enable the people to purchase an abundance of pictures, satisfactory in artistic quality and exhaustive in subject, before it is too late. Yours,

H. L. BRIDWELL.

[MR. BRIDWELL and others who have addressed us in similar vein are quite right in assuming that it is through no fault of ours that we have not kept our promises as to illustrating the World's Fair buildings. It is evident from the public complaint that has been made by publishers of all

kinds in every quarter of the country that one of the most annoying and probably one of the most prejudicial blunders made by the authorities of the Fair, in that it, in a manner, has excited the hostility of the press, has been the manner in which publishers have been denied reasonable courtesies in the matter of securing illustrations of the buildings. It seems to be all the more inexcusable since the making of negatives and prints has not been leased out as a "concession," but has been retained by the authorities in a department under an "official photographer." Without attempting to determine whether the delay and annoyance we and other editors and publishers have been put to have been caused by an inadequate organization of this department, by a demand upon it which no organization could satisfy, or by indifference or incompetency on the part of some or all of the employés, the result is that, up to this time, nine months of persistent efforts on our part have only secured four negatives. But at last the tide has changed, and temporarily is setting our way, though whether with enough strength to enable us to keep our promises remains to be seen. At all events, we have secured within a week a few more negatives, the first fruits from which are shown by the contents of this issue. Finally, if we do not succeed in keeping our promises, it must be understood that the blame cannot rest with us, for not only did we have full justification for making the promises, but we have neglected no effort to keep them. — EDS. AMERICAN ARCHITECT.]

GUIDE-BOOKS TO ROME.

NEW YORK, N. Y., August 26, 1893.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Please tell me of some book which gives useful information to an architectural student who wishes to go to Rome. Kindly give me the price and the place where sold. Kindly answer this through the columns of the *American Architect.*

Yours faithfully, J. C. DUNN.

[FOR an ordinary sojourn, a copy of Baedeker's "*Central Italy*" is all in the nature of a guide-book that one needs; while A. J. C. Hare's "*Walks in Rome,*" published by George Routledge & Sons, of New York, price $3.50, affords enough information, both historic and artistic, to make even a longer visit intelligible. — EDS. AMERICAN ARCHITECT.]

TRAP-VENTILATION.

NEW YORK, N. Y., August 24, 1893.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — In the paper entitled "A Review of Recent Plumbing Practice," read by Mr. Glenn Brown, F. A. I. A., at the World's Congress of Architects in Chicago, and reprinted in a recent issue of your journal, Mr. Brown asserts that I "practically avoid in my works the question of trap-ventilation."

This statement is erroneous and misleading, and shows that Mr. Glenn Brown has either not read my books carefully or else that he has not taken the trouble to understand correctly the opinions expressed by me regarding the "back airing" of traps.

It is, in my judgment, only a question of time when all plumbing regulations will be so changed as to leave it optional with the owner or architect of a building whether to "back air" his traps, or to adopt the much simpler and safer system of non-siphoning traps.

I have, as early as 1884, gone on record as being opposed to any useless and expensive system of trap-ventilation, and have since then repeatedly asserted my belief in, and preference for, non-siphoning traps and a simpler plumbing system. On page 123 and following, of my book "*Hints on the Drainage and Sewerage of Dwellings,*" published in 1884, I expressed my opinion regarding trap-ventilation as follows:

"While admitting that such air-pipes render S-traps practically safe against most of the above-made objections, it cannot be denied on the other hand, that they largely increase the cost of plumbing in dwellings, especially so, where fixtures are much scattered throughout the house.

"First, they complicate the work and are difficult to run in old buildings, and must be largely increased, in the case of high buildings, towards the upper floors.

"Second, they increase the evaporation of water in traps, and therefore aggravate the danger from sewer-gas entering through fixtures in cases where these remain unused for a long time.

"Third, it is quite possible that vent-pipes stop up in time at the crown of the trap with splashings from soap-suds, when they will cease to furnish air to break the vacuum. Unluckily, such fact would not reveal itself, and is not easily detected, nor is much known at the present time about this point.

"The literature on this subject has been lately enriched by numerous careful and valuable experiments upon the siphonage of traps, made by Col. Geo. E. Waring, Jr., assisted by the writer, by Messrs. Edw. S. Philbrick, C. E., and Ernest W. Bowditch, C. E., of Boston, by Mr. S. Hellyer, of London, England, Dr. Lissauer, of Dantzic, Germany, Dr. Renk of Munich, Germany, and others.

"The results of the first mentioned experiments are greatly at variance, and seem to indicate, that while in some cases traps need a strong protection against siphonage, in other cases, especially where the soil and waste-pipes have ample ventilation, and branch wastes are very short, such protection is not required. At any rate, it is too early yet to establish rules which apply to all cases. *It has always seemed to me as if it would be feasible to practice a wise discrimination.*

"Where a fixture is located remote from a vertical pipe, and consequently discharges through a long run of waste-pipe, which would otherwise form a "dead end," it is positively necessary to run a vent-pipe from the crown of the trap upward to the outer air, which prevents in the first place a stagnation of air, and at the same time stops siphonage; and this is true of any kind of trap, not only of the class of traps known as S-traps. It should apply to mechanical traps as well.

"If, on the other hand, such fixture is located quite near to a vertical thoroughly ventilated soil-pipe, or a well ventilated horizontal run of pipe, I should not hesitate to place under the fixture a trap which is not easily siphoned, leaving out the air-pipe if there is no vent-pipe near by to connect to. Such a course seems especially desirable in the case of high buildings for single fixtures in basements, or on lower floors. For instance, a one and one-half inch sink trap in the basement of a flat, such as is now being erected in New York City, 200 feet in height, would require an air-pipe at least three or four inches in diameter to prevent siphonage, the friction in a one and one-half or two-inch pipe two hundred feet long being too great to allow the air to enter quickly enough to break the suction. I would consider it foolish extravagance to use such long length of pipe of such large size for the trap of only a single sink. If a non-siphoning trap could not be made to answer the purpose, the only sensible course to pursue would be to abandon such fixture entirely.

"I must further say that it seems to me dangerous to use vented S-traps with the usual water-seal of only one and one-half or two inches under bowls or tubs in spare or guest rooms of large city residences, and for such dwellings generally that are occupied only a part of the year. This danger is generally disregarded or passed over lightly by enthusiasts for "back-air" piping. My personal preference in such cases would always be for a non-siphoning trap, with a water-seal which does not so easily evaporate, or for a non-siphoning trap with a mechanical seal against gases from the soil-pipe, and where rules of local Boards of Health would demand such an air-pipe under such conditions, I should probably advise the use of a tight-shutting stop-valve on the waste-pipe,[1] and combined with it an arrangement for simultaneous shutting off the hot and cold water supply to the fixture, so as to render an overflow impossible. I am quite ready to admit that the latter arrangement would tend to complicate the plumbing work, but, I think, everybody must concede that, under the conditions mentioned, it would be safer than a vented S-trap with usual slight seal."

In my work "*House Drainage and Sanitary Plumbing,*" second edition, revised, published in 1884, I expressed a similar opinion, as follows:

"It is always costly and often very inconvenient to run vent-pipes to the roof. The plumbing work is greatly complicated, and the number of joints which may leak sewer-air, greatly increased by trap-ventilation. There is also danger that the vent-pipes for traps under tubs, sinks and bowls may stop up with soap-suds or grease, in which case they would cease to act properly. The continuous current of air in the vent-pipe, in passing over the water in the trap, undoubtedly increases its evaporation. Finally it becomes necessary, in the case of high buildings, largely to increase the diameter of vent-pipes, in order to make up for the loss through friction necessarily occurring with long air-pipes. Therefore, while I consider vent-pipes for traps a necessary evil in many cases, especially for water-closet traps, I am inclined, in other cases, to prefer a good non-siphoning water-seal or mechanical trap, provided the soil and waste-pipe system has ample ventilation. Such a mechanical or anti-siphoning trap may be used under sinks, tubs and bowls, but for water-closets and slop-hoppers (if without a strainer) the simple lead water-seal trap with vent attached is the only safe device."[2]

In an article published in the Chicago *Inland Architect,* in 1885, and subsequently reprinted in 1887 in my book "*Recent Practice in the Sanitary Drainage of Buildings,*" I stated as follows:

"Experiments have established, with a sufficient degree of certainty, the fact that the self-cleansing siphon-pipe, or running traps, cannot be depended upon always to retain their water-seal against siphonage, unless air is admitted at the crown and sewer-side of the trap, either by some anti-siphoning trap attachment, or by a so-called "back-air" pipe, of ample size. Consequently, I should not use such traps without providing such protection as the remedies mentioned afford. Later experiments have shown that an air-pipe is not a reliable protection against siphonage in all cases, especially where the course of the air-pipe is long and tortuous, and that where fixtures are not in constant use, it furthers the evaporation of the water in traps, and hence endangers the safety of plumbing work. That it increases the cost of plumbing, and hinders simplicity of arrangement, must be conceded by all. Thus while it offers certain advantages in some instances, there are other cases where the disadvantages predominate. It remains then, to be decided, only after a thorough and intelligent consideration of all conditions, whether a seal retaining water-seal trap safe against back pressure, siphonage or other influence, or an anti-siphoning trap attachment of some kind, may not be preferable."

In an article on "The Drainage of a House," published in Boston in 1888, and subsequently reprinted in 1890, in the second edition of the book "*Recent Practice,* etc.," I stated:

"From my best knowledge and belief, I cannot accept as universally necessary the requirement of "back ventilation" of traps. . . . I do not fail to explain to my clients that the back airing of traps is done at the expense of simplicity; that in a properly laid out system, trap vent-pipes are not necessary to prevent dead ends in short lateral waste-pipes; and that prevention of siphonage can be accomplished, and the extra cost incurred by using back-air pipes be saved in all but rare instances, by adopting simpler and well-known devices.

"Where I am compelled to run back-air pipes, complicating the pipe system, it is always my endeavor to modify the arrangement so as not to expose the water in the trap too much to the air current; for there can be no question that the thereby increased free circulation of air in the vicinity of the sealing water of traps hastens the unsealing — by evaporation — of traps under fixtures which remain unused for some days in succession, and endangers the security of all traps during any period when a house is left unoccupied."

The above quotations must convince any unprejudiced person that I am not a blind believer in trap-ventilation. They will also suffice to refute the careless assertion of Mr. Brown, that I avoid the question of trap-ventilation.

By kindly giving space to the above in the columns of your esteemed paper, you would oblige,

Yours respectfully, WM. PAUL GERHARD,
Consulting Engineer for Sanitary Works.

[1] Such a combined trap and shut-off valve is now obtainable in the market.

[2] The many forms of excellent siphon and siphon-jet closets now obtainable are constructed with a very deep and effective trap-seal, which does not require a vent-pipe where the piping is properly arranged.

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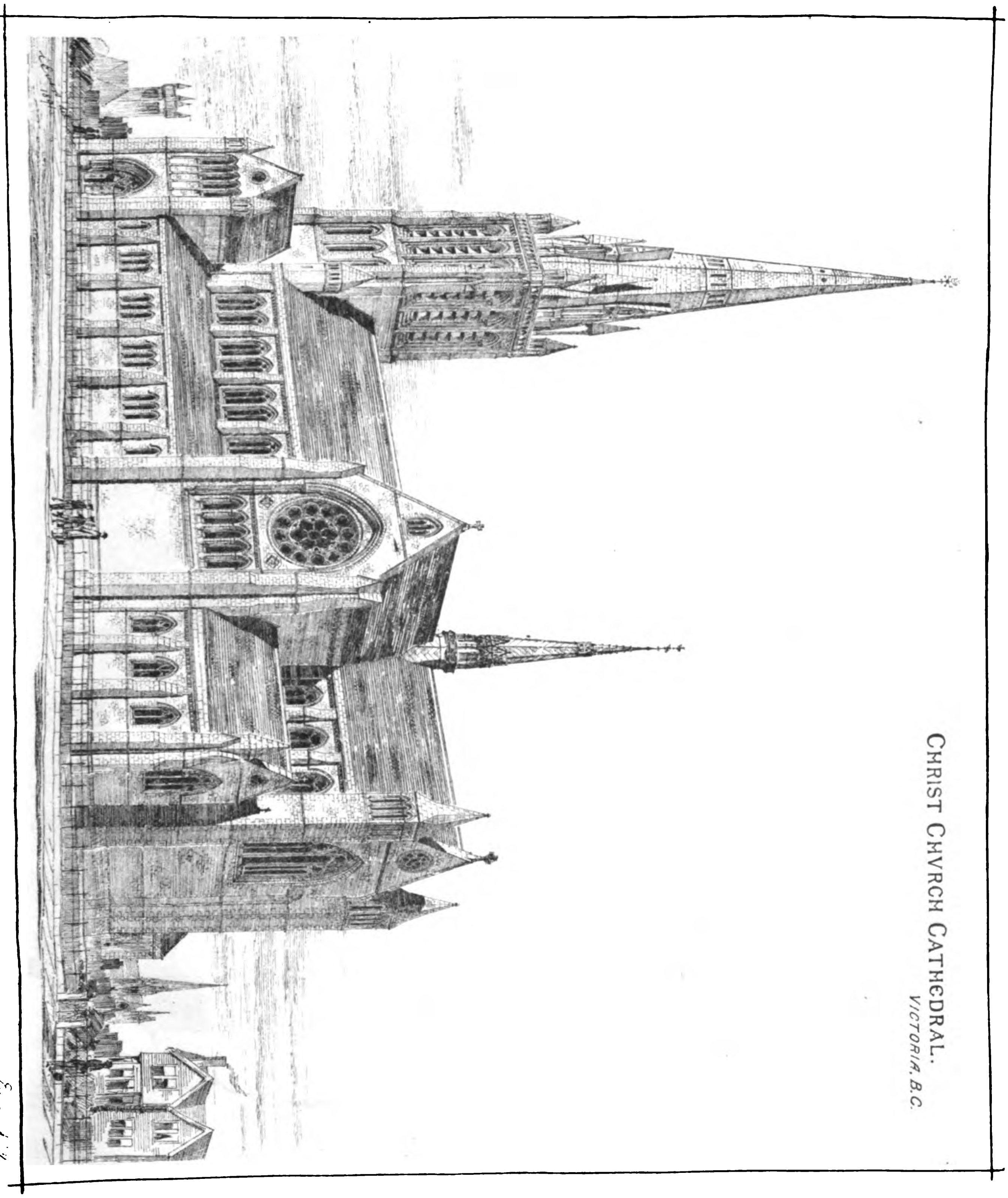

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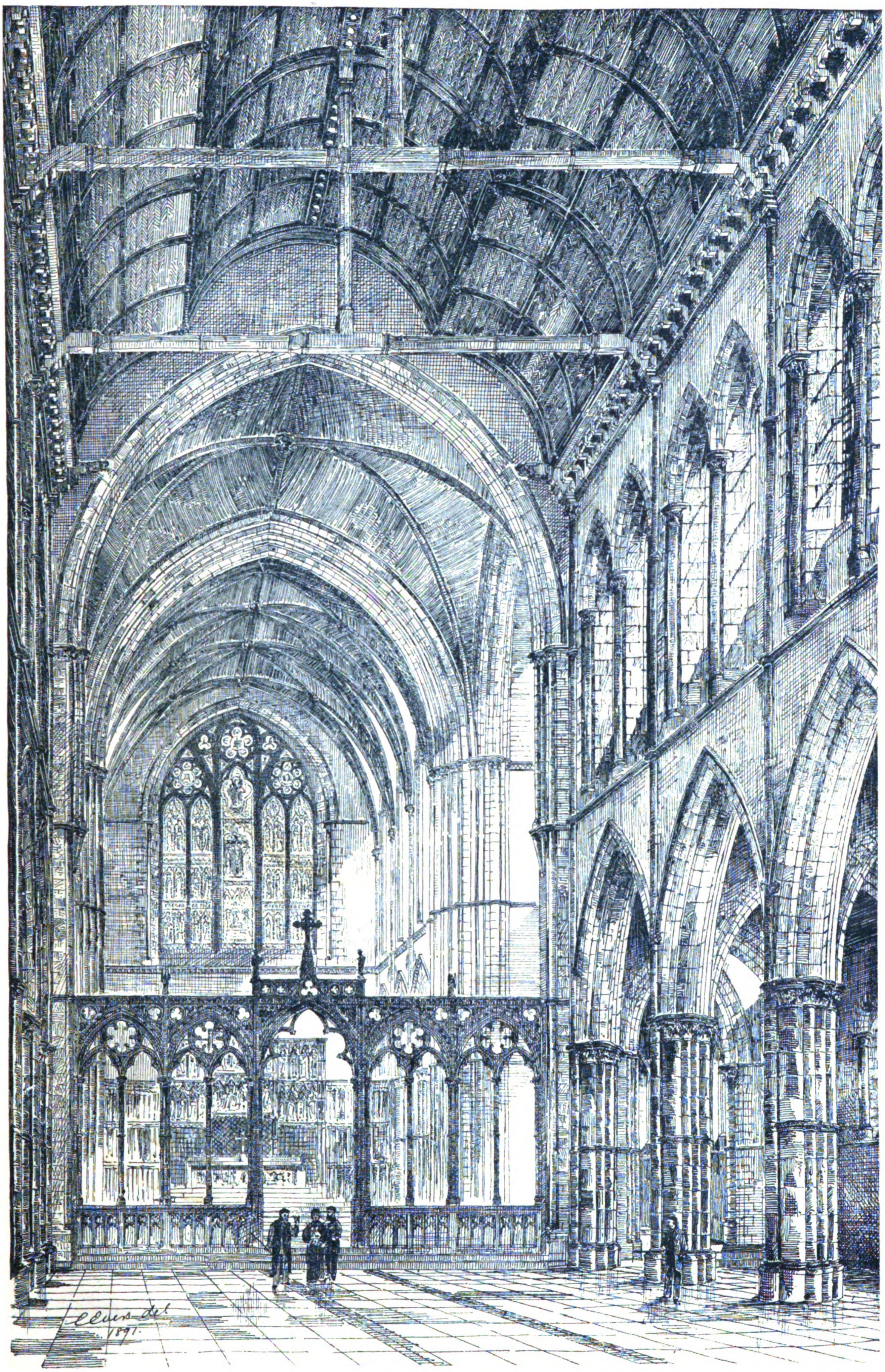

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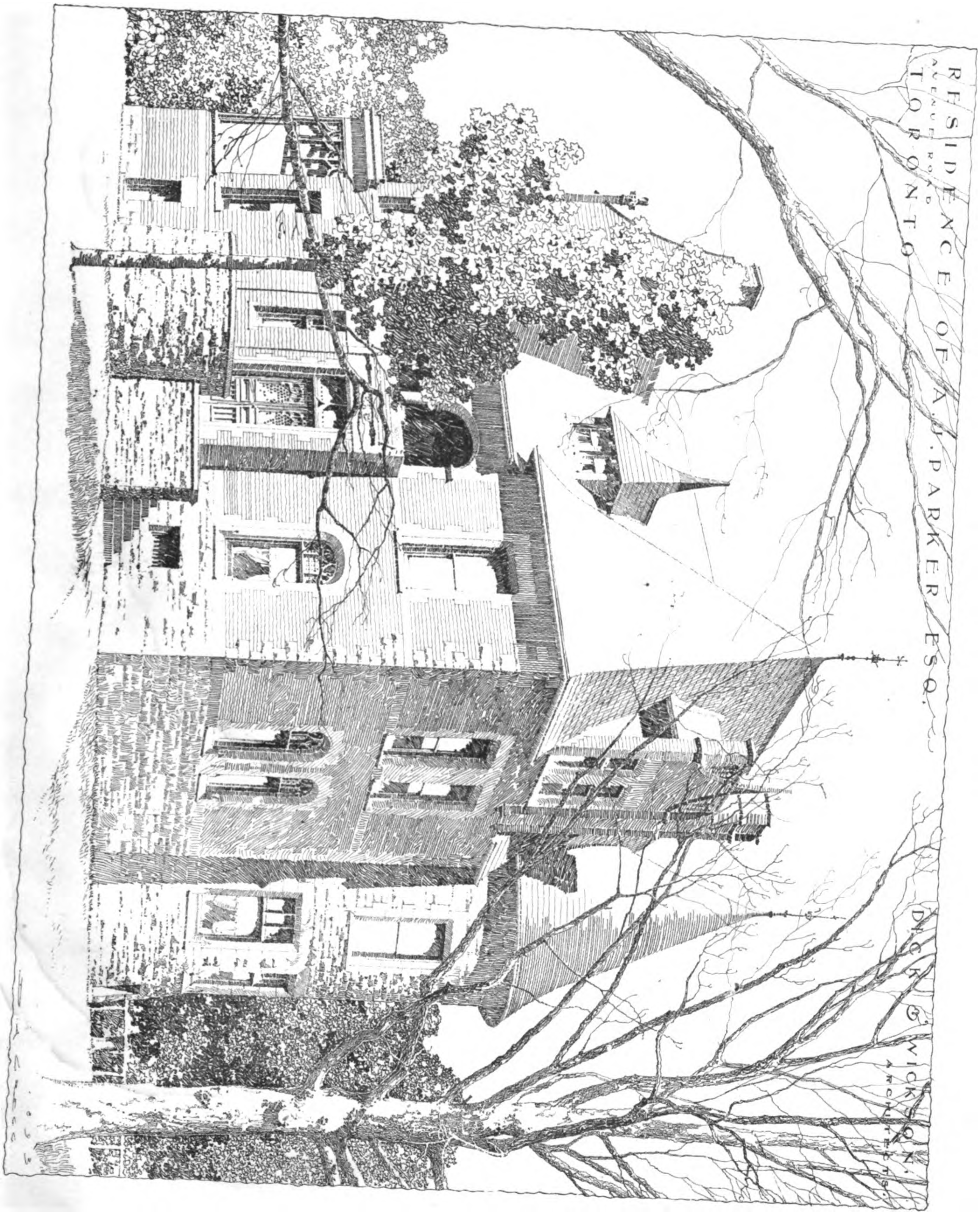
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SEPTEMBER 9, 1893.

CONTENTS

A TERRIBLE accident took place last week on the Boston and Albany Railroad, at Chester, a small place in the mountains, between Springfield and Albany. At Chester, the railway crosses the Westfield River, where an iron lattice-girder bridge, in two spans, was thrown across the stream. The bridge was built about 1870, and was calculated for lighter locomotives and trains than those now in use, so that, with some other bridges of similar construction, it was in process of being strengthened, to adapt it to modern requirements, by the rather primitive process of riveting additional plates on the top and bottom chords. In order to apply and rivet the additional plates, it was, of course, necessary to take the old rivets out of the chord plates, and clear the holes, so that the new rivets could be put in. This was done in sections, about ten feet of the chord having its rivets removed at a time. On the day of the accident, the workmen employed by the contractors for the repairs had just removed the rivets from one section of one of the chords, when twelve o'clock struck, and they dropped their tools, and made themselves comfortable for their dinner. A few minutes later, the Chicago limited express, consisting of five heavy sleeping-cars, and one of the largest locomotives on the road, weighing, it is said, ninety tons, dashed at full speed upon the bridge. The truss which had been dismantled instantly gave way, plunging the locomotive and three cars into the river, killing fourteen persons, and injuring about thirty others.

THE explanation of the accident is even more obvious than is usual in such cases, and every engineer will say that the bridge could not have been expected to behave differently under the circumstances; but some rather nice points are involved in the question who shall be held responsible to the injured persons for the catastrophe. The railroad company, it is understood, denies that it can in any way be held responsible, and refers inquirers to the bridge-contractors, whose men certainly caused the accident, by taking out the chord rivets, and who, as independent contractors, must bear the burden of any misconduct of their men. It seems to us, however, that the responsibility will not be so easily shifted from the railway company. The newspapers say that the men, having taken the rivets out of a section of the chord, should have applied the new plates, and made all safe again, before taking their dinner; but riveting a ten-foot section of chord-plates is a long job, and it would hardly occur to ordinary workmen to lose their dinner for the sake of providing against a chance of accident which they could not appreciate, even if they knew that the train was due. In fact, it is difficult to see why they should have been expected to concern themselves at all with the running of trains. It would have been impossible for them to know the time at which the trains would arrive, or their weight and character, and, although the foreman might have been expected to be intelligent enough to send out a flag while the bridge was disconnected, it would be much more prudent, as well as more natural, for the railway company itself to have a man on the ground, familiar with the running of the trains, and expert enough to judge when the bridge was safe or unsafe. It may be that railway companies should not be expected to go to so much expense and trouble where bridges are being repaired, but we hope that there are some companies which are willing to do so much for their passengers, and, if we can find out their names, we shall, for our part, travel in preference by their lines. Moreover, it seems to us a serious question whether a railway company is exercising due caution in hurling its heaviest trains, at a speed of thirty-five miles an hour, upon bridges which have been adjudged to be too weak to endure such strains safely, and are known to be in process of repair, by a method which necessarily reduces their resistance for at least half the time that the work is going on, to a point far below that required for sustaining even ordinary strains.

A SCHOOL of Applied Design for Women was opened last year in New York, at No. 200 West Twenty-third Street, and begins its second year September 18. It would be difficult to recommend the school more highly than to say that it is under the direction of such artists as J. Carroll Beckwith, B. C. Porter, and Frederic Crowninshield, seconded by Justice George L. Ingraham, of the Supreme Court, Dr. Brown, of St. Thomas's Church, and others. The course is not limited in length, but it is expected that pupils who have not already learned to draw will spend the first year in preliminary work. After the elements of drawing and the first part of the history of design have been mastered, as shown by examination at the end of the year, the pupil is allowed to choose the branch of applied design to which she wishes to devote herself, or may combine two courses if she prefers. At present, the regular courses include the designing of carpets, wall-papers, silk, furniture, book-covers and metal-work, architectural drawing, etching, illustration and lithography, and it is intended to add courses in glass-staining, interior decoration and fresco-painting. The cost of tuition has been kept as low as possible, and scholarships are awarded to the best students, which reduce the cost of instruction to little or nothing. If any of our readers should wish for further information, they may apply to the Secretary and Treasurer of the School, Miss Ellen J. Pond, 200 West Twenty-third Street, New York.

THE great competition for the Opéra Comique in Paris has had what we should think a very singular sequel. It is hardly necessary to say that a contest of that sort usually leaves a certain amount of discontent among the competitors, but, with us, the disappointed ones usually do their grumbling in private, while the Opéra Comique competitors have rushed before the public with their griefs in a manner quite without precedent. One reason for this is probably to be found in the fact that the jury was required by the Government to submit a report of its votes, and to give the reasons for its choice among the competitors; and another was that the designs were submitted under the real names of their authors, so that the jury were enabled, if they wished, to award the prizes to their personal favorites, as they would be sure to be accused of doing if they had the opportunity. Even thus, however, the affair might have gone off quietly, had not M. Charles Garnier, who was one of the jury, incautiously allowed himself to be questioned by a newspaper reporter. As the result of the interview, an article appeared in the *Figaro*, informing the public that M. Garnier was not at all surprised at the criticism which the decision had called forth, that he considered M. Bernier's design, which was awarded the first prize, to be unworthy of the first, or even of the second place; that he had not voted for it, and had energetically opposed the judgment in favor of it, and was very sorry that a different opinion had prevailed. He would not say, according to the reporter's story, that M. Bernier's plan was bad. M. Bernier was an artist of talent, but he had not understood the requirements of a theatre. There were, however, ten or twelve exceedingly successful

designs, so nearly equal in merit that the jury might almost have decided among them by lot. One of these, however, that of MM. Larche and Nachon, appeared to him better than the rest, and he had in vain claimed for it the first prize. This was certainly a very frank, not to say indiscreet, confession on the part of a member of the jury, and the *Figaro* article attracted general attention, but M. Garnier himself wrote a note the next day, declaring that he had taken no active part at all in the discussions of the jury; that although he thought M. Bernier's design was not the best, he had not attempted to influence the other members of the jury against it, and that in regard to the design of MM. Larche and Nachon, which he thought the best, and the jury placed second, he had kept entire silence, for the reason that its authors were personal friends of his, and he wished to appear entirely impartial.

THIS letter was followed by one from M. Francisque Sarcey, the famous critic, to the *Radical*, in which he denounced the choice of M. Bernier's plan as an "outrageous and brutal violation of justice," and disclosed what purported to be several interesting secrets from the consultations of the jury. Among other things, he said that Bernier's design, at the first general inspection, appeared so weak that it came very near not being included among the twenty-two designs which the jury considered worthy of a second look. In fact, it would probably have been eliminated, had not some one fished it out again from the pile of rejected ones, saying that Bernier was an official architect, connected with the School of Fine Arts, and that it would be a slight upon the Administration not to admit it to the final examination. M. Sarcey said that, not pretending to judge in such a matter, he had asked the opinion of several architects not concerned in the competition, all of whom agreed that the decision was shameful, while one of them told him that in the jury itself there was so much indignation at the result that one of the jury, who voted against Bernier, and who is a member of the Institute of France, said to another juryman, who would like to belong to the Institute, and who voted for Bernier, that, until then, if his name should come up for election to the Institute, he should, knowing his talent, have voted to admit him, but that he could never vote for any one capable of assisting to award the first prize to such a plan as Bernier's. Naturally, this tempestuous condition of the celestial minds stirred up the smaller lights of the profession, and M. Gaspard André, who had been awarded a fourth prize, wrote to another newspaper to express his opinion of MM. Duvert and Charpentier, who had also received a fourth prize, and whose proximity to himself on the ladder of Fame he seemed to find disagreeable. In regard to the artistic merits of the obnoxious design, he said he would not himself undertake to judge, but he had consulted several of his Parisian friends, who agreed that it ought to be ranked in about the sixtieth place, instead of the fourth; and in regard to its success in convenience of arrangement, as to which he was himself competent to judge, he thought that it should rank about as high as in artistic quality. It may be imagined that this sort of letter-writing is not calculated to promote good feeling among the competitors, and there seems to be some probability in a comment made by an outside architect, that this would be the last of the competitions, or, perhaps, the last in which decent French architects would risk their reputation. As to the merits of the case, we think that architects here would find it hard to choose between the plans of M. Bernier and MM. Larche and Nachon, both of which are published in the French professional journals. While the latter have an effective front elevation, and a good and simple plan, with a large auditorium, they gain space for the auditorium on the limited lot assigned to the building by corbelling out an immense staircase, about fifty feet long, and of something like six feet projection, on each side of the building, over the sidewalk, extending from the second floor level to the roof. Of course, this startling feature is of light iron construction, but, however fashionable it may be in Paris just now to have a street front liberally "bowwindowée," one can forgive a jury for not finding the style quite suitable for a State theatre. M. Bernier's plan, although it gives a smaller auditorium, and allots an unnecessarily large space to vestibules, is simple and straightforward, and has the great merit of being contained within four good stone walls, while the front, if not so effective as MM. Larche and Nachon's, is quite as interesting, and more dignified. M. Planat, in *La Construction Moderne*, makes the suggestion that Bernier, being connected with the Administration, received the votes of the officials on the jury, while Larche and Nachon were the favorites of the architects. On the first ballot, however, only three members of the jury, on which there were twelve architects, voted for Larche and Nachon's design, so that, supposing all the officials to have voted for Bernier, the suffrages of the architects on the jury were divided between five other competitors. In fact, far from being unanimously in favor of Larche and Nachon, the anti-Bernier faction, on the first ballot, gave four votes, their largest number, to the plan of MM. Duvert and Charpentier, the one which, as M. André discovered, ought to have been ranked sixtieth, and it was not until the second ballot that Blondel, and Duvert and Charpentier, disappeared from the list and their votes were found to be divided between Bernier and Larche and Nachon, raising the number of ballots for the latter to five, but giving a decisive majority to Bernier. How the squabble will turn out, it is impossible to say, but there is, so far as we can see, no evidence of bad faith on the part of any members of the jury, and not much evidence of bad taste, and it is a pity to have the decision of any jury, and, most of all, one so eminent, called in question in the public prints without good reason.

MR. FRANK H. MASON, our Consul-General at Frankfort, whose admirable consular reports have done honor, not only to himself, but to the country of which he is the thoughtful and patriotic representative, calls attention to the extraordinary progress which has been made of late years in Germany in iron and steel manufacture. It is well known that Belgian iron manufacturers have for some years competed successfully for contracts with English manufacturers in England itself, but the English iron-masters could console themselves with the thought that wages were very low in Belgium, and the Belgian work often rough and inferior. Within the past three or four years, however, German manufacturers have not only sold car-wheels, axles, wire and other finished ironwork in England, at lower prices than the English manufacturers could furnish them, but have exported immense quantities of these, together with iron and steel rails, to countries which lately depended entirely on England for their supply, while English exports of railway iron and steel have diminished from 1,000,000 tons per annum a few years ago to 467,986 tons in 1892. As no country in the world possesses such natural advantages for producing, manufacturing and exporting iron and steel as Great Britain, there must be some potent reason for the rapidity with which Germany, with inferior ore, a limited supply of coal and disadvantageous shipping conditions, has, in three or four years, taken away more than one-third of England's foreign market for goods which the English supposed that no one could produce and sell so cheaply as themselves. This reason Mr. Mason finds in the success with which the Germans have applied the theoretical knowledge in which they excel, and, especially, what he calls their "unrivalled chemical skill," to perfecting their metallurgical processes, and inventing new methods for utilizing waste products, or economizing material and labor.

THE *Builder* gives a little news from the Delphi excavations. It will be remembered that before the site of Delphi can be opened, the modern village of Castri, which is built on the ruins, must be removed, with its inhabitants, who must be provided for elsewhere. This work has taken some time, and, indeed, will not be completed until September, but in the meantime a little excavation has been done, with the result of discovering the Treasury of the Athenians, a small building, only ten metres long, which seems to have served as place of deposit for valuables belonging to Athenian pilgrims. The *Builder* says that not only is this discovery valuable, as affording a point the relationship of which to the other important buildings is known, so that future explorations can be laid out by reference to it, but it is encouraging to find that the Treasury fragments are so complete that the building might almost be reërected. This indicates that the ruins have not been used as a quarry, or despoiled by lime-burners, as has been the case in many other parts of Greece; and, if the other buildings prove to be in similar condition, the investigations will be of extraordinary interest.

A REPORT UPON THE LANDSCAPE ARCHITECTURE OF THE COLUMBIAN EXPOSITION TO THE AMERICAN INSTITUTE OF ARCHITECTS.[1]

THIS paper has been written at the request of the Institute, with the object of briefly accounting for such part of the preparation of the Exposition of 1893 as has come within the responsibility of the landscape architects, and as a contribution in this respect to a record of its genesis and development as a work of design.

No comprehensive definition of the responsibility of the landscape architects has been recorded, and as to what is implied by the name of their office different understandings are had. For this reason, something needs first to be said in explanation of the view which will herein be taken.

In the *Quarterly Review* of 1820, page 303, there is an article written by Sir Walter Scott, from which it appears that this master of words did not approve of the term "landscape gardening," which was then coming into popular use. His objection to it was that it tended to confusion between two classes of purposes, or motives of art, which could not well be blended together. To make this objection clear, it may be observed that the word garden comes to us from the same root with girdle, girth, garth and others to be found in every European tongue, all of which imply something limited, restrained and separated from what exists beyond or about it, or that is the cause of such limitation, restriction or separation. From remote times, the word in its various forms — English, Spanish, French, Italian, Scandinavian — has carried with it this idea of limitation and exclusion. We yet speak of "garden-flowers," meaning certain flowers exclusive of others. Taking up a book with the title, "*A Garden of Verse*," we should understand it to be a selection of verse. Being told at a farm-house that one of the family of the house is "in the garden," no countryman would think that this meant either simply out-of-doors, or in a stable-yard, or an orchard, or a common cultivated field, a grove, a park or a pasture. The word implies reference to a limited, defined and exclusive space, and it may be used in this way antithetically to the word landscape, the application of which is so comprehensive that it may take in houses, lawns, gardens, orchards, meadows, mountains and even the sky, with the stars to the remotest nebulæ.

The word landscape is often used by accurate writers interchangeably with the word scenery, as, for example, by Gilpin in his series of works on the scenery of Great Britain; also by Hamerton in a recent treatise on landscape written from the point-of-view of a landscape painter.

A distinction implied by the word landscape unfitting it to be compounded with the word garden is indicated by Hamerton when he says that: "Much of the comprehensiveness of natural scenery depends upon the degree in which mass appears to predominate over detail. In perfectly clear weather, a mountain does not look nearly so grand as when . . . its nearer details are only partially revealed amidst broad spaces of shade. So it appears with other elements of landscape — they lose in comprehensiveness as the details become more visible." Thus, for the enjoyment of landscape beauty, we are to regard the detail of what we see mainly as it affects the character and expression of masses, these masses being considered as elements of composition and perspective. On the other hand, for the enjoyment of garden beauty as such, we must scrutinize objects of detail discriminatingly. We must see roses as roses, not as flecks of white or red modifying masses of green.

Lastly, to understand aright the term "landscape architect," we must bear in mind that the word architecture is not limited in application to works of building. The Almighty is referred to as the Architect of the Universe. Plutarch writes of the architecture of a poem, meaning the plotting of it. "The architect of his own fortune" is an old proverbial term yet commonly used in our newspapers, and is applicable as well to a banker or a miner as to one whose fortune has been made by directing works of building.

In view of the considerations thus presented, when the office of landscape architects to the Exposition was created, what, in the absence of specific instructions, was to be understood as the leading duty of that office? The answer assumed by those to whom the title was applied was that their leading duty must be to reconcile the requirements of the problem which the directors had before them in respect to buildings, and means of access to, and means of communication between, buildings, with the requirements of pleasing scenery and of scenery which would be pleasing, not because of the specific beauty of its detail, but because of the subordination and contribution of its detail to effective composition of masses as seen in perspective.

Adopting such a view, the first thing to be noted in an account of the landscape architecture of the Exposition is this:

Immediately after the settlement in the Directory of the question of its own organization and rules, the question of a choice of sites came up, and it soon appeared that the debate of it was likely to be inconveniently prolonged. Thereupon the suggestion was made that expert counsel upon it might be desirable, and an inquiry was addressed to our office as to the terms upon which counsel could be had. Upon receipt of our reply by telegraph, we were asked to come to Chicago as soon as practicable. We did so by the next train, and, upon arrival, were presently taken to examine in succession seven proposed sites, three on the Lake and four inland.

The country about Chicago is flat and mainly treeless, except that in a few places there are small areas of dense woods. Its subsoil generally and its surface soil largely is a tenacious brick-clay. The climate in the spring is severe under successive alternations of southerly and northerly winds. The latter sweeping over the icy lake from the semi-arctic regions north of Lake Superior, the demand upon energy of vegetation is apt to be peculiarly trying. Accordingly, the choice of a suitable site was necessarily to be a choice of difficulties. Of the seven sites to which our attention was called, there was not one the scenery of which would recommend it if it had been near Boston, New York or Philadelphia. After our first general review of the premises, we adopted the opinion that nothing was to be found on any of the inland sites that could be weighed against the advantages, in respect to scenery, of the Lake Shore. Next, as to the sites on the shore, we concluded that, provided suitable means of transportation for goods and passengers between the town and the place could be secured, the northernmost of those proposed would be the best. By comparison with the most nearly competing site, it would require less outlay to prepare the ground and establish suitable means of interior transportation, water-supply, drainage and sewerage; the great marine commerce of Chicago would be passing in review before it at a suitable distance for spectacular effect; an arrangement of buildings simpler and much grander than elsewhere would be practicable, and the buildings would have a much better setting and framing of foliage provided by standing woods, fairly vigorous, and of sufficient height to serve as a continuous background.

But a committee of the Directory, taking up the question of transportation between this site and the central parts of the town, advised us that the railroad companies concerned could not be induced to make the outlay of capital required for such arrangements of transportation as we thought needful. Thereupon we fell back on the southernmost of the sites proposed on the Lake, which went by the name of Jackson Park.

Our report favoring this place excited much remonstrance. Opposition to it was concentrated in favor of an inland site near by, known as Washington Park, the advantages of which were thought to be so great and so obvious that a leading member of the National Commission assured us that after an inspection of the two sites in question, not one vote in ten could be got for our proposition. In the few days that intervened before the Commission met, we gave the reasons of our choice as well as we could in private conversation, but I do not think we accomplished much. In the end the Commission accepted our advice, not because a majority of its members understood the grounds of it, but because they could not be led to believe that we should have given this advice without having, as experts, sound reasons for doing it. The result was due to respect for professional judgment. Comparing this experience with some in my earlier professional life, I can but think that it manifests an advance in civilization.

Unquestionably, to common observation, the place was forbidding. At different periods in the past, sand-bars had been formed in the lake a few hundred feet from, and parallel with the shore. The landward one of these, gradually rising, would at length attain an elevation above the surface of the water. There would then be within this bar a pool accurately definable as a lagoon. Gradually, in this case, lagoons thus formed had been filled nearly to the brim with sand drifting from the outer bar, and had been turned into marshes. Thus nine-tenths of the surface of the site, or, in fact, all of it that had not been artificially made otherwise, consisted of three ridges of beach sand, the swales between which were more or less occupied by boggy, herbaceous vegetation. Upon the innermost two of the ridges vegetable mould had gathered and trees had sprung up in scattered groups. The most important of these trees were oaks. The situation being extremely bleak, the soil subject to be flooded, and the sandy sub-soil water-soaked, these had had an extremely slow growth. The largest were about forty feet in height. They were very feeble and many of them dilapidated through loss of limbs broken off by gales from the lake.

A more serious difficulty than any involved in this consideration was found in the circumstance that the level of water in the lake, and consequently in the marshes, was fluctuating, and this not only from day to day, as would be determined by winds at a distance drawing it off or backing it up, but its average level varied from year to year. An engineer who had been in charge of operations upon the Lake Shore, and who had had occasion to study the matter with accuracy, advised us that the probabilities were that in 1893, the average elevation of the surface of the lake would be four feet higher than it was at the time when we were studying the plan, or than it had been during the year before. It will be readily understood how difficult it became to forecast landscape effects in a region of low shores, without knowing within four feet what the level of the water was to be by which these shores were to be washed.

The Jackson Park site had, twenty years before, been selected as a site to be reserved for a public park. If a search had been made for the least park-like ground within miles of the city, nothing better meeting the requirement could have been found. It will, then, naturally be asked: Why was such a place fixed upon for a

[1] A paper by Frederick Law Olmsted prepared for the American Institute of Architects and read before the World's Congress of Architects at Chicago.

park? I have not the specific knowledge required for an answer, but I may mention that it is a common thing with town governments when they find bodies of land which, because of their special topographical condition, are not favorable to the ends of dealers in building-lots, to regard them as natural reservations for pleasure-grounds; to label them accordingly on their maps, and to refrain from ordering streets to be laid out across them. This is not peculiarly a Western custom. The sites for the Central Park, for the Morningside Park, for the Riverside Park, for the Mount Morris Park, for Tompkins Square, and, no doubt, for other public grounds in the City of New York, were thus selected. So was the site of the public ground in Boston, officially called the Fens, but popularly known as the Back Bay Park. Sites having been thus obtained, landscape architects are asked to contrive how pleasure-grounds can be made of them. It has been so, I believe, in London, conspicuously in the case of Battersea Park. And it may be remembered that the opportunity of making the Tuileries Garden in Paris occurred because, while the city had been building out about the place, the necessary ground had been held in reserve while the clay which it contained was being removed to be used for making roofing-tile. In the Millennium it may be hoped that landscape architects will be employed to select land with regard to the specific purpose for which it is to be used. When that is the case, the making of a park will be less costly than it is at present.

At the time the land and water of Jackson Park had been taken for a public park, I was in partnership with Mr. Calvert Vaux, and we were asked to devise a plan for making it available for a public pleasure ground, together with the site now known as Washington Park and the strip of land between them, now known as the Midway.

As the starting-point for the development of the proposition which we then made, the suggestion was adopted that dredging-boats might be employed, to begin at the lake and first reopen the old lagoons, taking the excavated material to be lifted out of their bottoms to form the basis of higher, more undulating and varying banks resting on the old sand-bars; next, to move through the Midway and so on to the inland park site, everywhere lifting out the material needing to be removed in order to open a channel in which they could float, and so shifting this material to one side or the other as to provide the base of varying shores, these shores to be afterwards covered with soil and landscape masses of vegetation.

When Jackson Park was chosen as the site for the World's Fair, the general landscape design of no part of the plan, of which the expedient I have described was the germ, had been carried out. In the Washington Park part of the scheme, a good deal had been done following the leading outlines of the plan, but with a modelling of surfaces and a choice of material and disposition of foliage looking to condition of detail rather than of masses, and with entire disregard of the elements of mystery through effects of aerial perspective, and the complicated play of light and shadow and of reflected tints in extended composition.

In the nominal carrying out of plans in the preparation of which I have had part there have often been sacrifices of the designs of these plans which have been mortifying and disappointing. In no other case, however, had the disappointment been so great as in this. Nowhere else had the opportunity for forming agreeable scenery been so lost. But, in the lagoon district, what little had been done had not been done unwisely.

Coming to consider what might yet be done with this same lagoon district suitably for the purposes of the Exposition, the question at once came up how far the general theory of the old plan for a public pleasure-ground to be formed upon it could be made available to the special purpose of the Exposition.

As a result of this consideration, we came to the conclusion that the element of the water-ways in the original plan being carried out, retaining-walls being built in various places for holding up the excavated material to be piled upon the shores, so that in these places terraces would be formed, the necessary buildings of the Fair could be advantageously distributed upon the surrounding sandy ridges.

Before making their formal report favoring the choice of Jackson Park for the site of the Exposition, the landscape architects took counsel with Messrs. Burnham & Root, presenting their views of the manner in which, this site being adopted, it should be used, and obtaining confirmation of them, more especially with reference to the expediency of distributing the needed large buildings upon the sandy ridges, and of spreading out these ridges suitably for the purpose by retaining-walls to be backed by the excavated material from the lagoons. It may be observed that, to accomplish this purpose in various localities where otherwise lagoons with shores of a natural character would become unsuitable for boats, it was thought best to give them the character of canals; that is to say, to make them formal and give their banks, which would necessarily be walls, an architectural character in harmony with the buildings to which, in a near perspective view, they would form foregrounds.

Mr. Burnham, in his report of operations, addressed to the President of the Exposition on the 24th of October, 1892, thus describes the process of forming the first complete graphic sketch illustrative of the design:

"After consideration of sketches made on the ground, . . . a crude plot, on a large scale, of the whole scheme was rapidly drawn on brown paper, mostly with a pencil in the hand of Mr. Root, whose architectural prescience and coördinating talent was of invaluable service to the result. The plot, formed in the manner described, contemplated the following as leading features of design: That there should be a great architectural court with a body of water therein; that this court should serve as a suitably dignified and impressive entrance-hall to the Exposition, and that visitors arriving by train or boat should all pass through it; that there should be a formal canal leading northward from this court to a series of broader waters of a lagoon character, by which nearly the entire site would be penetrated, so that the principal Exposition buildings would each have a water as well as a land frontage, and would be approachable by boats; that near the middle of this lagoon system there should be an island, about fifteen acres in area, in which there would be clusters of the largest trees growing upon the site; that this island should be free from conspicuous buildings, and that it should have a generally secluded, natural, sylvan aspect, the existing clusters of trees serving as centres for such broad and simple larger masses of foliage as it would be practicable to establish in a year's time by plantations of young trees and bushes. Because the water in the lagoons would be subject to considerable fluctuations, it was proposed that their shores should be occupied by a selection of such aquatic plants as would endure occasional submergence and yet survive an occasional withdrawal of water from their roots. Time pressing, the pencil, large-scale, brown-paper plot above described, with a brief written specification, almost equally sketchy, was submitted to the Corporation, and, after due consideration, on the 1st of December, 1890, was adopted as the plan of the Exposition."

The question may be asked: In what degree at this early period was the result forecast which has since been attained in respect to the effect of boats, bridges and water-fowl and overhanging foliage on the lagoons? The answer is that it was quite fully anticipated in a general way. The effects of the boats and water-fowl as incidents of movement and life; the bridges with respect to their shadows and reflections, their effect in extending apparent perspectives and in connecting terraces and buildings, tying them together and thus increasing unity of composition — all this was quite fully taken into account from the very first, and the style of boats best adapted to the purpose became, at once, a topic of much anxiety and study.

The next important step in the progress of the enterprise to which reference is here necessary was that taken by Mr. Burnham, which resulted in the meeting at Chicago of the Advisory Board of Architects, with Mr. Hunt as its Chairman. The landscape architects were made members of this board, and their general plan came up for critical review. Many suggestions for its amendment were made by the building architects, but in nearly all cases counter-suggestions were offered by others of them, and, the balances of advantages being weighed, the result was at length a cordial and unqualified approval of the plan as originally presented, and this was duly expressed by a resolution and report to the Commission.

The general plan was, however, afterwards modified in certain particulars. These particulars were the abandonment of a proposed outer harbor for which the landing pier now seen was substituted; the introduction of the Peristyle, and of the Colonnade at the end of the south transept of the main court. All of these changes resulted from suggestions of the building architects, cordially welcomed by the landscape architects.

The general plan was later modified in one matter, to its great injury. Two of our firm had visited the last World's Fair in Paris, while it was in preparation, under the guidance of its landscape architect. The third of our number, Mr. Codman, had passed several months in Paris, while the Fair was in progress. We all thought, and Mr. Codman was particularly strong in the conviction, that it was an unfortunate circumstance that visitors so generally entered the Paris Exposition at points and by ways not adapted either to give them a grand impression, or to provide a convenient point of dispersal for systematic observation. This in Paris grew largely out of the situation of the Exposition. There was no similar difficulty in the Chicago situation and the very first step in our revision of the old park plan in adaptation to the requirements of the Fair was to fix upon a focal point of interest to be regarded as the centre of design, and to so place this centre that conveyances of all kinds, by land and by water, the railways and the boats, both those of the interior and those of the exterior, should conveniently discharge visitors into it and receive visitors from it. That it should thus be made a place of general exchange, a place for obtaining information and guidance, as well as a place of departures and returns, a spacious court was designed; the Administration Building was placed in this court; the buildings likely to be most frequented were placed so that they would open from it; the intramural railway was to have its principal station in it; the whole interior water system was planned with a view to easy connection with and through it by the small boats.

All railways and all steamboats were to conveniently receive and discharge passengers through it. A union station was provided for with the latter object in view. We intended that the Administration Building, which stands in this court, and this railway station should contain the principal provision of guides and wheel-chairs and the central office of a system of offices of "public comfort" to be in telephonic communication with it. We did all in our power to have this arrangement carried out. The failure to carry it out has

added, in my opinion, to the cost of the Exposition and deducted much from its value. In reporting to you professionally, I have thought it necessary to say this, not in the least in a complaining way, but that it may go on record for the benefit of those who may have to deal hereafter with a similar problem. You will ask why we were unsuccessful? I do not fully know. I can only answer that our failure took the form of a failure of prolonged negotiations with the Illinois Central Railway.

At the period when the general plan was formed it was impossible to have building masses definitely in view except in the case of a few of the larger ones. Our instructions as to these were that a classification similar to that of the last Paris Exposition was to be contemplated, but that the buildings required under the classification would be a third larger than the corresponding buildings in Paris. We presumed that additional buildings would be wanted and that they would be of smaller but of varying size. For these presumed, but as yet undetermined, smaller buildings, we held three large spaces in reserve. First, for such as would be wanted for the live-stock exhibits, an area at the south end; second, for the distinctive office and "headquarters" buildings of the National and State Committees, an area at the north end; third, for miscellaneous exhibition-buildings of a smaller class, the strip of land called the Midway. We calculated that restaurants would be established in the great Exposition buildings, and that the terraces of some of these buildings would be occupied to a considerable extent with refreshment tables and chairs, under awnings. We did not suppose that there would be many small buildings scattered about between the main great buildings, nor do I think that it was at the outset contemplated by those in direction that there would be. Afterwards they were seen to be financially desirable.

Also, it is to be noted that it was our original intention and that this intention was fully set forth, to have what has since been called the Wooded Island, occupying a central position, held free from buildings and from all objects that would prevent it from presenting, in connection with the adjoining waters, a broad space in contrast with the artificial grandeur and sumptuousness of the other parts of the scenery. After a time demands came for the use of the island for a great variety of purposes, and at length we became convinced that it would be impossible to successfully resist these demands. When we reluctantly reached this conclusion, the question with us was which of all the propositions urged, if adopted, will have the least obtrusive and disquieting result? Probably we were fortunate in securing the occupation of the island only by the temple and garden of the Japanese, and for the display of horticultural exhibits. Nevertheless, we consider that these introductions have much injured the island for the purpose which in our primary design it was intended to serve. If they could have been avoided, I am sure that the Exposition would have made a much more agreeable general impression on visitors of cultivated sensibility to the influence of scenery.

With regard to the subsequent occupation of ground by smaller structures, especially such as are of the class called pavilions and concession buildings, many of these have been inserted without consulting us; places being often given them in which they intercepted vistas and disturbed spaces intended to serve for the relief of the eye from the too nearly constant demands upon attention of the Exposition buildings. As a caution to those who will manage the next affair of a similar class, it is best to record the opinion that the effect of these little structures among the larger has been bad. I can best show our judgment of it by saying that it had been our original intention to use on the grounds a great deal more of gardening decoration in various forms than we have. We had, at considerable expense, provided materials for the purpose, largely in the form of plants propagated and kept last winter under glass. But at last when the time approached for making the intended use of this material, the spaces of the Exposition grounds not occupied by the larger building masses and trees appeared to us to be everywhere already a great deal too much divided and disturbed by little features intended to be more or less of a decorative character. So much was this the case that, after consideration, and with reluctance, we concluded that our intended floral decorations would add so much disquiet to the already excessive disquiet of the scenery, and so detract from the effect of the more massive elements, that they must be abandoned.

One other modification of the original plan must be referred to. The administration at one time contemplated the introduction of a branch railway, by which Illinois Central trains would be taken from the Midway to the station upon the main court through the Fair ground. To give room for this branch road, we were required to change the position assigned to the Horticultural Building, reduce the breadth of the lagoon, and modify the outlines of the island. Afterwards the railway project was abandoned, but in the meantime work had been done compelling adherence to the unfortunate revision of the shores. It will readily be seen that the cramping of the water at this point has been a considerable loss, and that, had the advances and recesses of the foliage masses opposite the Horticultural Building been much greater than they are, a more picturesque effect would have been obtained.

Passing from matters of design to matters of construction: As to the more bulky preliminary operations of dredging and sub-grading, they were mostly affairs of large contracts, and, while we were constantly consulted, the preparation of details and the superintendence of the contractors' works was made by the Director of Works mainly the duty of the engineer corps. The same was the case in a still greater degree with respect to the often extremely difficult and delicate matters of drainage, sewerage and water-supply throughout the grounds. It is only necessary, then, to say with reference to these matters, as well as to those of buildings, that our coöperative relations have been of a character to be looked back upon with pride and congratulation. Really, I think that it is a most satisfactory and encouraging circumstance that it could be found feasible for so many men of technical education and ability to be recruited and suitably organized so quickly, and made to work together so well in so short a time. I think it a notable circumstance that there should have been so little friction, so little display of jealousy, envy and combativeness, as has appeared in the progress of this enterprise. Too high an estimate cannot be placed on the industry, skill and tact with which this result was secured by the master of us all, yet I venture to say that, considering the impromptu way in which Mr. Burnham had to go to work, and the extremely varied antecedents in the matter of education, custom and habit of those through whom he had to operate, equal success would have been possible only in a country which was in a high degree, socially as well as politically, a republic.

I have only to add a few statements in respect to that part of the work of which the landscape architects were placed especially and more independently in general superintendence.

On this point, I will observe, first, that we early recognized the importance of not entering upon undertakings which might lead to the requirement of outlays, the reasonableness of which could not be made plain to the Directory, or which we could not be confident that, in the progress of the work, the financial department would sustain. Also, we took well into account that various resources that would be available in any large capital of Europe would not, in Chicago, be at our command, and, further, that we should have to push much of our work very rapidly with unknown and untrained men. After completing operations of grading, draining and the supplying of suitable soils, we should have, for much of the ground, but one fall and spring for planting operations, for none of it more than two, and it is rare that a weak and sickly appearance is to be avoided in freshly-made plantations. We considered also that we had to deal with many inexactly known conditions — conditions, I mean, of climate, as of the occurrence of rains and floods and sudden inroads of severe frosts in the planting season; conditions of uncertainties as to how the bottom and banks of our excavations would behave, as, for example, how they would be affected by subterranean springs. To illustrate this latter hazard, I will mention that at important points, after our channels had been excavated, there were movements, slips and uprisings of the sandy bottoms, forming shoals, and, as the result of the subsequent re-dredging of these places, adjoining banks and slopes slid away and caved off. Through this process, and from the effect of ice which formed to the depth of two feet along the shores and remained late in the spring, we lost, in spite of all precautions, many thousand water-plants that had been collected, propagated and set with great painstaking.

From the start we took all these hazards and difficulties into account, and devised our design at all points so that success in what we aimed at would not greatly depend on exact and refined local particulars, but on masses and broad general conditions.

One main difficulty to be considered was that of making sure of the clothing of several miles of newly-made, raw, sandy shores with a clean, graceful, intricate, picturesque green drapery, varied in tints and pleasing in its shadows and reflections. We knew that we could depend but little on the ordinary commercial agencies for the materials required for this end, and within a week after the work was put under our direction we had begun the gathering, by special collecting agencies, of the plants required. We placed our dependence mainly on two classes of these: first, willows, chiefly of the shrubby sorts, but in large variety; second, herbaceous, bog and water-side plants, principally such as are commonly known with us as flags, cat-tails, rushes, irises and pond-lilies. Some of these were propagated on the Fair grounds; a few were bought from nurserymen and florists; much the larger part was obtained by parties organized and sent out for the purpose to various localities on the shores of lakes, rivers and swamps in Illinois and Wisconsin.

Altogether, we have planted on the shores of the lagoons one hundred thousand small willows; seventy-five large railway platform car-loads of collected herbaceous aquatic plants, taken from the wild; one hundred and forty thousand other aquatic plants, largely native and Japanese irises, and two hundred and eighty-five thousand ferns and other perennial herbaceous plants. The whole number of plants transplanted to the ground has been a little over a million.

Our chief executive in the immediate direction of working operations has been Mr. Rudolph Ulrich. He had never been employed under our direction before, but we had seen the results of rapid work carried on under difficulties by him, and had formed a good opinion of his abilities to meet emergencies. On the very day of our appointment, we telegraphed across the continent to ascertain if he would be available. Our message reached him at a moment when he happened to have just left a California work in which he had been engaged, and he was at once secured. It had been our policy to encumber him as little as possible with directions in detail, but to explain to him our aims and trust largely to his discretion as

to particulars. He has entered admirably into the spirit of the design, and the zeal, activity, skill and industry with which he has labored to carry it out cannot be too highly esteemed.

MODERN ASYLUMS FOR THE INSANE.[1]—V.

ADMINISTRATIVE BUILDINGS.

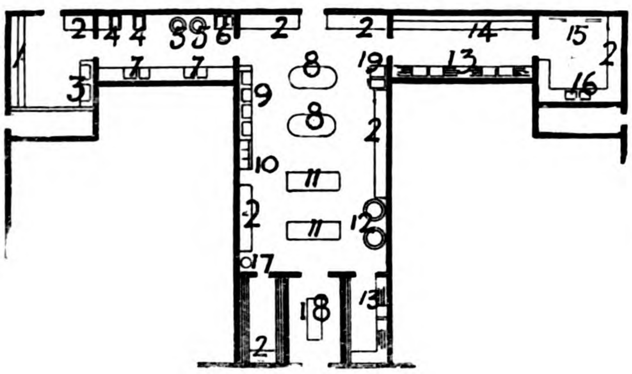

Fig. .

1. Slate-shelving.
2. Dresser.
3. Potato-bins.
4. Potato-washer.
5. Vegetable-boilers.
6. Vegetable Steaming-chest.
7. Vegetable-washer.
8. Boiling-pans.
9. Gas Roasting-ovens.
10. Hot Plate.
11. Table.
12. Tea Apparatus.
13. Sink.
14. Dresser-shelving.
15. Knife Machines.
16. Knife Sink.
17. Beef-tea Apparatus.
18. Hot Closet and Carving-table.
19. Warrenizers.
20. Rack-shelving.

THE buildings required in large asylums for the accommodation of the numerous officers and servants as well as the storage of supplies, and the provision of space for cooking, baking and laundry works and a variety of other purposes, must necessarily be of great extent, and in arranging this portion of his building the architect must carefully bear in mind, while designing the apartments to be occupied by the staff, that the social status of the officers, their mode of living and salaries vary to a great extent, and that he has to provide for the professional medical superintendent with a stipend of a thousand pounds or more a year, as well as the porter or laborer who is in receipt of a few shillings a week; provision must be made pro-rata for the accommodation and comfort of all classes, who tend to administer to the wants of the patients, a task, which even to the humblest workers, must be most trying and irksome. The architect should, therefore, use all his skill to alleviate the duties, as we have already shown can be done even in the judicious arrangement of wards, and in the department we are now considering he can do much to render the hours of rest from their labor hours of comfort, ease and refreshment to the officers of the asylum. So painful and distressing are the duties of many who are concerned in the administration of a lunatic asylum, that occasionally insanity has attacked those who have been long brought into contact with the asylum patients; this, therefore, compels the architect to afford all arrangements, whereby the officers, when off duty may be able to avoid, to some extent, the scene of their duties.

As we shall see in the course of this chapter, the resident medical officer is the leading light of a lunatic asylum: we must, therefore, first consider what are the best arrangements that can be made in designing and locating his residence in relation to his onerous duties and his few hours of respite. His house should, undoubtedly, be as nearly central as possible, that he may be equidistant from all parts of his little colony of patients; the nearer he can be placed to the ward occupied by the sick and infirm, the better, for it is in this ward his attendance is most frequently needed. As the doctor is compelled at all times and in all weathers to visit the asylum, his house should be connected with the main building by a covered and enclosed corridor which might be heated as well as the hall, from the general heating apparatus of the asylum.

Considering the social position and salary of the medical superintendent of an asylum, the residence for such an officer should contain a good-sized dining-room, a drawing or reception room, a morning or smoking room, as well as a room set aside for official work in the form of a combined study and office. In addition to the usual kitchens and offices there should be about seven or eight bedrooms, a good hall and staircase, bath-room, etc. We have said that the usual salary of this officer in English asylums is £1,000 a year, in addition to which he has his house-rent free, and coals, gas, or electric light, milk and vegetables from the asylum stores.

For planning the house and in choosing the location of the site, care should be taken that no windows or garden ground should overlook the airing-courts which are used by the inmates of the institution, for the scenes enacted therein are not always such as should be witnessed by the inmates of a private dwelling.

En route between the asylums and near the doctor's house there should be a cloak-room and lavatory, etc., for the use of the medical officer; this affords an opportunity for the doctor to remove the clothing he wears during his visit to fever or infectious patients before entering his home, if properly arranged.

It is well also to provide a conservatory of fair size, from which flowers could be obtained, not only for the domestic use of the doctor's household, but also for the wards occupied by the sick and infirm: cheerfulness is a great aid in relieving patients from their malady, and flowers should be most plentifully provided.

Sometimes a detached residence is provided for the first-assistant medical officer, as the salary of this official is, as a rule, moderate, say about £250 a year and other allowances; his income is not sufficient to support a large establishment, and his house must, therefore, be designed accordingly. Very frequently all the assistant medical staff have apartments or suites of rooms in the administrative buildings, with private sitting-rooms, but a common mess-room, billiard-room, etc. The salaries of these officers vary from £120 a year to £250 with board, lodging, washing, etc.

The assistant medical officers' apartments should be kept, for obvious reasons, as near the centre of the asylum as possible, but, at the same time, distinct from the quarters occupied by the nurses and matron and other female attendants. Special lavatories, bath-rooms and water-closets should be provided, and it is well not to omit the smoking-rooms where the junior doctors may assemble for social intercourse. A billiard-room, too, is a valuable adjunct to these quarters, but it is seldom that the architect is permitted to go to this extent in providing relaxation for the workers in the asylum; especially is this so when a billiard-room is erected in the asylum for the use of the patients, for then it is available for the staff also.

For the other superior officers — such as the steward of the asylum, the chaplain, clerk to the asylum, the engineer, matron, laundry-matron, head-gardener and a certain number of married attendants — detached or semi-detached residences or cottages should be provided, the size in proportion to the salaries received and allowances granted.

The officers of less importance, comprising the inspectors, assistant matrons, work-mistress, single attendants and nurses, the night-watchers, porters, messmen, gate-porters, cooks, bakers, master-tailors, shoemakers and many others, should be lodged within the precincts of the asylum.

It can be easily understood that in a large asylum there is a necessity to retain a staff of carpenters, bricklayers, painters, plumbers, etc., to maintain the fabric in good repair; this portion of the asylum staff is, however, not lodged in the asylum, and is paid by the day or by the week at the usual trade rate of wages, without allowances. There are, however, some who are employed as labor-masters among the active patients, who spend their time in working at a trade.

The superintendent of an asylum has usually started his career by entering the asylum as one of the junior medical assistants, and thus he is scarcely ever engaged in any other kind of practice. His appointment is, in all probability, gained because he has shown an aptitude in some smaller sphere for organization and maintenance of discipline among a body of subordinates. The medical superintendent of an asylum is the head of an establishment containing many hundred insane inmates and a numerous staff of attendant laborers and servants. The master's eye must be ever on the watch, and he must never be long away from any matter which is under his control; for this reason, it would be impossible for the chief medical officer to engage in any kind of scientific research which required continuous observation, because it would be impossible for him to seclude himself. He is usually at some little distance from a town, and is thus somewhat removed from a constant change of ideas with men of his own profession, except, indeed, through the press. His comfort depends upon satisfying his committee of management by the mode in which he discharges his administrative duties, and concerning which they, being, as a rule, men of business, are competent judges; but, in reference to the manner in which he performs his medical duties, they cannot be expected to discriminate between good and bad results.

It will be clearly understood from what we have here stated as to the duties of the medical superintendent that, not unnaturally, his administrative duties tend to take the place of and overshadow more and more what is purely medical, and that his ambition is to be the governor of an asylum that may be cited as a model of good management, rather than one which is in the van of scientific discovery.

In designing all classes of buildings, the architect should make himself thoroughly acquainted with the exact purpose for which the building will be used, the ways of the people who will occupy it, and then use all his skill in providing the best possible arrangements to help those who have to carry on their life's work within the building he designs. In no class of building can an architect make himself more felt as a lasting benefit to the occupants than in a lunatic asylum, and, in order that he may be armed with every probability of success in arranging his plans, he must study the ways and mode of living of those for whom he is providing. It is most desirable, therefore, that he should have an intimate knowledge of the position of the medical superintendent, for this knowledge must of necessity influence his ideas in very many particulars of the plan of the administrative department.

We feel we cannot omit, while dwelling upon this point of our subject, quoting Sir James Crichton Brown, the Lord Chancellor's Commissioner in Lunacy:

[1]By George H. Bibby, F. R. I. B. A., F. R. Hist. S., and Ernest A. E. Woodrow, A. R. I. B. A. Continued from No. 923, page 143.

"Of course there are in some asylums, at this time, very able scientific medical men as medical officers, and there is a little scientific work going on, but the medical and scientific work carried on in the largest asylum (nay, in all English asylums put together) cannot for one moment be compared, as regards its character or results, with what is done in the smallest London hospital; and a large proportion of the cases that are admitted into county asylums in England do not get medical treatment at all; it is not attempted. Then, in regard to what is called 'moral' treatment — that is to say personal influence, occupation, amusements and the influence of surroundings, instead of this being carried out individually, as of course it ought to be, and adapted to each case, it is carried out in a wholesale way. Instead of being fine hand-painting, it is slop dashery. Amusements are provided and crowds of patients are sent to them. I believe, on the whole, the effects of even this imperfect system are very beneficial, but the treatment is not carried out on true principles. The duties devolving upon the medical superintendent are so numerous — he is called upon to attend to the choice of the staff, he is responsible for the farm, for the commissariat, and for the clothing, and these and other functions interfere very much with his medical duties. Then as a matter of practical experience, the medical superintendents of England have found that the Committees of Magistrates, who are their masters, are very much better able to appreciate the way in which they carry on the farm and attend to the finances or the general administration of the establishment than the way in which they do their medical work. This latter the justices are scarcely capable of judging of, and it used to be not an uncommon thing, in county asylums, for a young medical assistant, fresh from the schools, who had perhaps never seen a case of insanity in his life, to be put into one department and given charge of it — many hundreds of cases being completely under his medical guidance, while his chief, the superintendent, devoted himself to building or farming, and sometimes did not visit the wards for long periods together. I remember a case in a large asylum in the North, where a woman who had been in the asylum for four months, asked when the medical superintendent came into the ward, 'Who is that gentleman?' She was told he was the medical superintendent. 'Indeed,' she said, 'I thought he was the architect, he only comes when the chimney smokes, or the walls want papering, or something of the kind.' There used to be a great deal of that sort of thing, there can be no doubt about it.

"No one who is familiar with asylums in this country can dispute that medical superintendents have devoted themselves very largely to administrative work, and have been obliged to do so. When I was at the head of the West Riding Asylum, I had to sign checks for £40,000 a year. I had a staff of 200 nurses and attendants under my control, a large farm, a butcher's shop, a bakery and a brewery, weaving-sheds, for we wove all our own cloths and made our own clothing, and all that I was responsible for. The magistrates looked to me to insure efficient management of all these departments and it was with the utmost difficulty I succeeded in getting any time for strictly medical and scientific work."

Captain James: "And you consider the medical superintendent ought to be relieved from all drudgery?"

Sir James Crichton Browne: "I do as far as practicable. I think that in the county asylums in England which are at distances from towns and medical schools, you must have a single medical head in charge, although the medical superintendent ought to be relieved to some extent of routine drudgery. But in London, near our great medical schools, the conditions are entirely different, and there is certainly room for an asylum conducted on the hospital system."

Until recent years, while ample provision has been made in asylums for the recovery of large numbers of patients, under the influence of favorable surroundings, small opportunity has been given for the establishment of sound principles underlying the changes which lead to insanity and the judicious application of the same.

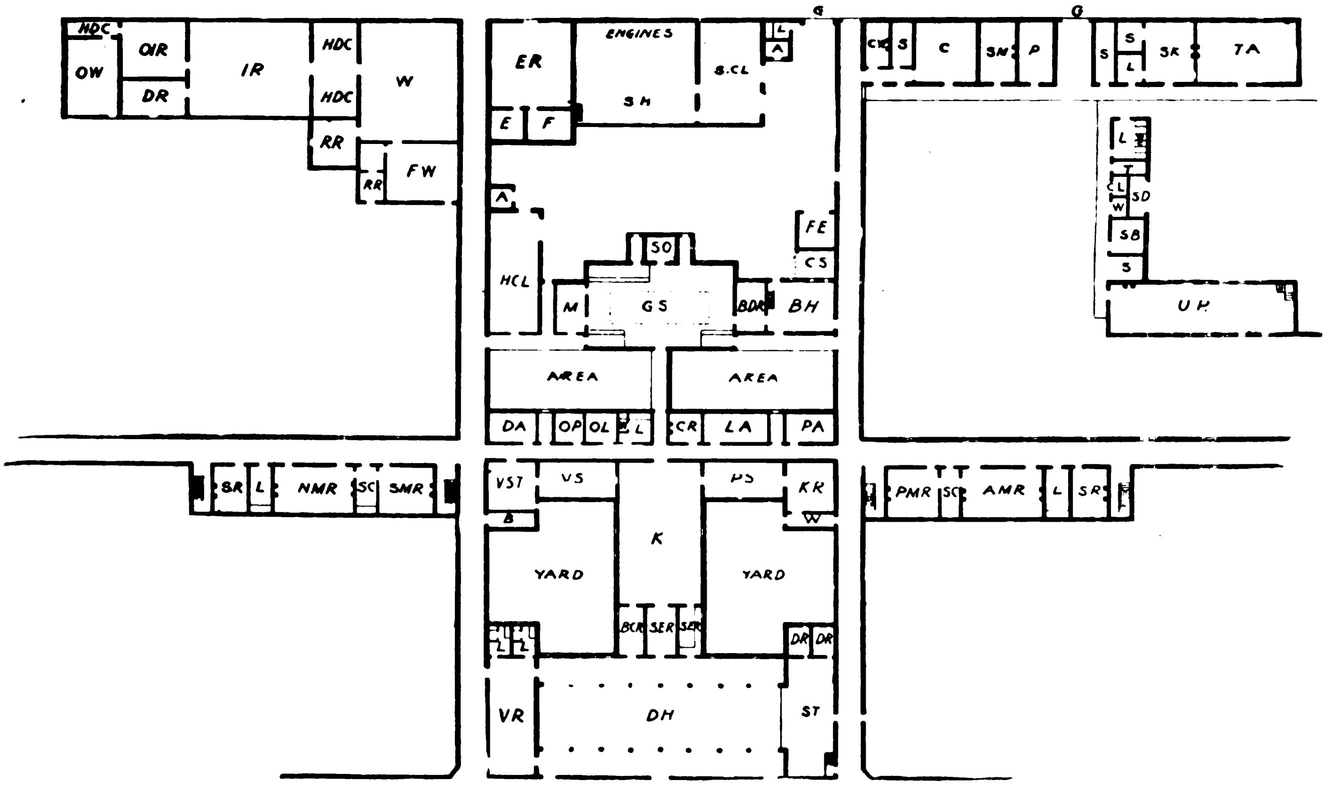

Fig. 2.

O W. Officers' Wash-house.
O I R. Officers' Ironing-room.
D R. Delivering-room.
H D C. Horse Drying-closet.
I R. Ironing-room.
W. Wash-house.
R R. Receiving-room.
F W. Foul Linen Wash-house.
E R. Engine-room and Dynamos.
E. Engineer.
S H. Stoke-hole.
S C L. Steam Coal-cellar, (200 tons).
L. Lavatory.
A. Ashes.
G. Gate.
C W. Clerk-of-Works.
S. Store.
C. Carpenters.
Sm. Smith.
P. Painter.
S K. Store-keeper.
Ta. Tailor.
T. Tools.
S D. Shed.
C L. Coals.
W. Wood.
S B. Store Baskets.
U P. Upholsterers.
S R. Spare-room.
A M R. Attendants' Mess-room.
S C. Scullery.
P M R. Porters' Mess-room.
K R. Knife-cleaning Room.
D R. Dressing-room.
S T. Stage.
D H. Dining-hall.
V R. Visiting-room.
K. Kitchen.
B C R. Bread-cutting Room.
S E R. Servery.
P S. Pot Scullery.
V S. Vegetable Scullery.
V S T. Vegetable Stores.
S M R. Servants' Mess-room.
N M R. Nurses' Mess-room.
H C L. House Coal Store, (150 Tons).
M. Meat Pantry.
G S. General Store.
S O. Steward's Office.
F E. Fire-engine.
C S. Coke Shed.
B H. Bake-house.
B D R. Bread-cooling Room.
D A. Dairy.
O P. Officers' Pantry.
O L. Officers' Larder.
C R. Cooks' Room.
L A. Larder.
P A. Pantry.
B. Brushes.

We have dwelt at considerable length upon the position of the medical superintendent. In actual practice, the architect who is entrusted with the erection of a large asylum will always find it of the greatest importance to have facilities for consulting from first to last a well-experienced medical officer, and it would be well, when a new asylum is projected, that the medical officer should be appointed to the asylum *before* it is erected. If this were always done, much loss and trouble would be avoided in alterations, etc. We have known medical superintendents of high skill in planning and architectural work, and can well recollect (although a quarter of a century has passed away) a great authority on insanity, seated in his architect's office, doing draughtsman's work as the most expeditious mode of conveying his instructions. This gentleman was a great expert of his day, and, sorrowful to tell, he destroyed his own life, and became a remarkable example of the fact (to which we have referred) that contact with the insane is an occasional source of absolute danger to the mental powers of the wisest and best of men.

Architects are too often apt to disregard the opinions and ideas of their clients, and too anxious to have their own way, but the architect who will not endeavor to bring his asylum into conformity with the wishes of a thoroughly competent medical superintendent

will have to regret his omission before the end of his work, but, of course, in matters purely architectural the architect must be paramount.

The matron, who is usually a well-paid officer of the asylum, must have a private house or separate apartments in the asylum. As in the case of other important representatives of the staff, she should be located as near to the centre of her duties as possible, within easy reach of the sewing-room, laundry and other places over which she has more or less control, in juxtaposition to the portions of the institution occupied by the female patients, and within easy access to the rooms set apart for female attendants.

It has been suggested that members of the medical staff should give instructions to the attendants by means of lectures. For this purpose a pathological laboratory and museum might with advantage be arranged as a lecture-hall, and, at the same time, provision made for photographing the patients upon admission, to form a record of their appearance, which process could be repeated from time to time.

The mortuary and post-mortem rooms should be associated in the same block as the pathological museum, and this arrangement has obvious advantages.

Near the chief entrance to the asylum there should be a good board-room for the asylum committees to hold their meetings in, and adjoining this should be the offices of the superintendent of the asylum, the clerks' offices and hall-porter's room. The waiting-room for the visitors should also be in the vicinity of the entrance, and be

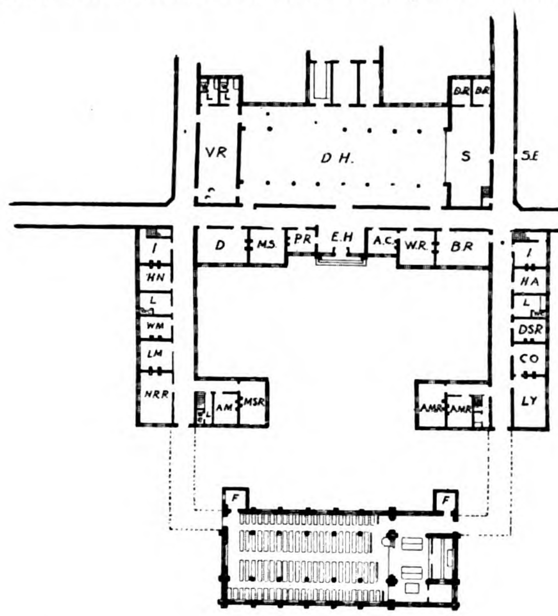

Fig. 3.

I. Inspector.
H N. Head-nurse.
L. Lavatory.
W M. Work-mistress.
L M. Laundry-mistress.
N R R. Nurses' Recreation-room.
A M. Assistant Matron.
M S R. Matron's Sitting-room.
D. Dispensary.
M S. Medical Superintendent.
P R. Porter.
A C. Asylum Clerk.
W R. Waiting-room.
B R. Board-room.
H A. Head-attendant.
D S R. Dispensing-room.
C O. Chaplain's Office.
L Y. Library.
A M R. Assistant Medical Officers' Sitting-room.
F. Fits-room.
E H. Entrance-hall.
D H. Dining-hall and Recreation-room.
K. Kitchen.
V R. Visiting-room.
D R. Dressing-room.
S. Stage.
S E. Scenery Entrance.

provided with lavatories, etc., near at hand. The whole of this block and the main entrance is frequently located close to the large dining-hall, so that the waiting-room for visitors may at other times become the ante-room to the hall when it is used in its capacity of entertainment-hall for concerts or theatricals.

The great dining-hall is always the largest room in the asylum, for it has the dual usage of dining-room and concert-hall, in which dramatic performances are also given. This room demands some architectural pretensions, even in pauper asylums; it should be of good proportions, well lighted and ventilated, and provided with ample means of exit. The arrangements should also be such that the attendants may have ready access to all parts, and be able to pass to and fro without disturbing the audience or performers.

The means of precaution adopted to prevent fire and panic in an ordinary theatre or concert-hall should be augmented to a great extent in the entertainment-hall of a lunatic asylum, for where the excitability of a sane audience is known to be so great as to cause panic at the least alarm, the peculiar mental condition of the patients of an asylum may be expected to be far more ready to cause them to utter cries of fear and cause panic. In the arrangements, therefore, of the hall, the architect should give special care for the safety of the patients, and not forget that the performers, as well as the audience, include patients.

As the hall is used for a dining-hall as well as theatre, the seats cannot be fixed to the floor; but the chairs should be securely fastened in lengths, so that they may not be easily overturned, and become obstructions to the gangways and exits. The gangways should be at frequent intervals, a gangway serving every six or eight seats, and they should lead in the direct line of an exit. The width of the gangways may be somewhat the same as for an ordinary concert-hall, namely, three feet, and the exit doors, which should be arranged at both sides of the hall, should be four feet six inches wide, and have no fastenings on them, except such as would yield to pressure from within; the doors should, of course, open outwards.

Fig. 2.

E. Engine.
S. Stokery.
C. Coals.
B R. Bread-room.
B H. Bake-house.

1. Sink.
2. Kneading-machines.
3. Working-board.
4. Oven.
5. Rack-shelving.
6. Moulding-board.

The performances on the stage in an asylum, in spite of the malady from which the patients suffer who take part in them, are frequently of a finished nature, and the stage should be furnished with the usual accessories appertaining to a small theatre. It is not our intention to repeat in this article, what has already appeared in the *American Architect* from the pen of one of us, as to the necessary precautions which should be observed on the stage of a theatre, but we must insist upon the need of the observance of every detail of care advocated in the articles on the subject which have appeared in this journal, and strongly recommend above all things caution in the manipulation of the scenery, the provision of the stage illuminant, and the fitting of an iron or fire-resisting curtain between the stage and the hall proper, which of course must be separated by a brick proscenium wall passing through the roof.

The attendants should have ready access to the stage, as well as to all parts of the auditorium and should not be even excluded from the dressing-rooms — this the architect should bear in mind. A gallery is sometimes found requisite, in the great hall, for the accommodation of visitors and strangers, but never should there be any seats for the patients above the ground-floor level. To place any portion of the audience who are mentally afflicted in a gallery is decidedly wrong, as there is a danger of their throwing themselves over to the floor below in moments of excitement. Access for the patients to the gallery should be rendered impossible. A gallery is often found useful as a place for a band of musicians when dances are given in the hall.

Referring now to the great hall in its capacity of a dining-room, the designer of the plan of an asylum must so locate his serving-rooms, kitchens, etc., that ample means may be obtained for the ready provision and service of the various meals, and the easy return of the crockery, etc., to the sculleries for washing-up. An arrangement having due regard to this end is shown in the annexed diagram, Figures 1 and 2.

Figures 1, 2, 3, 4 and 5 show an arrangement of the portions of the administrative portions of an asylum which we are describing to our readers: a careful study of these diagrams will perhaps convey more than we have been able to explain in words, and depict many requirements and detailed arrangements necessary, which we may have omitted to mention.

Figure 1 illustrates a general plan of the arrangement of the kitchens, with all the necessary fittings for the preparation of the food for the general body of the inmates of this class of institutions. This kitchen it must not be forgotten is provided in addition to the separate ward-sculleries referred to in a former number of these

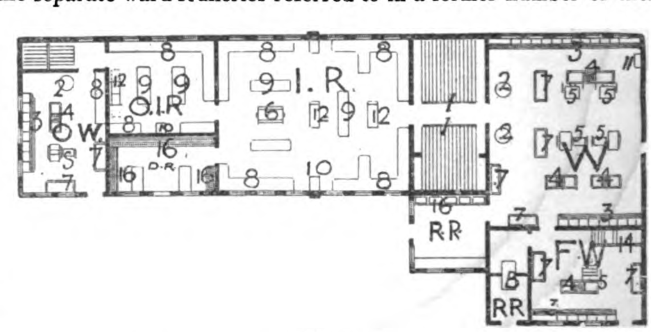

Fig. 5.

O W. Officers' Wash-house.
O I R. Officers' Ironing-room.
D R. Delivering-room.
I R. Ironing-room.
W. Wash house.
R R. Receiving-room.
F W. Foul-linen Wash-house.

1. Horse Drying-closet.
2. Hydro Extractor.
3. Washing-tanks.
4. Strainer and Rinser.
5. Washing-machine.
6. Calender.
7. Soaking-tank.
8. Ironing-board.
9. Table.
10. Ironing-stove.
11. Liquor-tank.
12. Mangle.
13. Disinfector.
14. Steeping-pit.
15. Sorting-bins.
16. Sorting-racks.

articles, where special, or invalids' food is prepared for the use of the patients who are unable to attend the meals in the great hall.

The large kitchen should not be less than eighteen feet or twenty feet in height, with good top-lantern lights, and louvered ventilators for taking off the heat, steam and smell of cooking. The floor-area should be so arranged as to allow ample space to pass around and

above the boiling-pans, stoves, boilers, ranges, tables and other cooking apparatus. The position and every fitting is fully indicated in Figure 1, by number, in what has been found the best position for the purpose for which each fitting is intended.

In many of the asylums much of the cooking is done by steam or gas, but the architect should never forget to provide an open coal fire for roasting purposes.

Figure 1 shows the most modern method of arranging the tea and coffee apparatus, the Warrenizers, etc., under steam-jackets, but we will not dwell now at any greater length upon this branch of our subject, as it will be our duty in a subsequent article to consider the important factors of cost and material with regard to this portion of an asylum.

In the annexed diagram (Fig. 1) it will be observed that between the kitchen and the great hall are shown three rooms, devoted to the purposes of the service, one being a bread-cutting room, one a general serving-room and one a carving-room in which a hot-plate is provided upon which the meat would be carved. In the same diagram will be seen an arrangement for the vegetable kitchen, wash-up sculleries, knife-cleaning room and vegetable stores, etc., at the back of the general kitchen; beyond these again are the pantries, larders and the other necessary offices of the cooking department, no mean portion of an asylum, and one requiring most careful study by the architect.

The position in which the whole of the kitchen block should be placed is certainly a central one with a view of supplying the whole of the asylum generally, at the cost of the least amount of labor, and with ready access to the stores department.

This last remark leads us to another important department, the stores of the asylum, a department whose extent is little appreciated by those who are not cognisant with the detail of asylum management.

The areas and cubical spaces required for the general stores of a large asylum are probably much greater than the majority of architects who have not had experience in such work might expect, we therefore give a list of the principal items of food and clothing served out during one year at Hanwell Asylum, together with particulars of the quantities required. A large portion of the clothing and bedding is manufactured or made up by the patients, and, of course, as this work progresses, ample space for the storage of the work (after being made up) must be provided as well as for the raw material.

HANWELL LUNATIC ASYLUM.

PROVISIONS CONSUMED.

		Year ending 31st December, 1889.	Year ending 31st March, 1890.
Average number of Officers and Servants	225		
" " " Male Patients	750		
" " " Female Patients	1,136		
	2,111		
Meat — Beef and Mutton	lbs.	266,156	267,101
Australian and Corned Beef	"	24,791	25,851
Extract of Beef	"	1,207	1,281
Bacon	"	33,996	33,868
Pork	"	24,876	25,828
Fish	"	56,791	57,489
Bread	"	794,974	798,874
Butter	"	40,653	40,277
Cheese	"	33,292	32,866
Cocoa	"	7,847	8,229
Coffee and Chicory	"	4,678	4,465
Eggs	No.	160,792	155,615
Flour	sks.	2,202	2,193
Malt	qrs.	435	442
Hops	lbs.	3,688	3,653
Oatmeal	"	5,916	5,982
Rice	"	4,310	4,306
Arrowroot	"	4,435	4,530
Sago	"	2,538	2,620
Currants	"	3,843	4,043
Raisins	"	1,371	1,474
Scotch Barley	"	1,292	1,256
Potatoes	bush.	7,948	7,959
Other Vegetables	"	13,210	13,414
Milk	gals.	46,451	47,797
" (Condensed)	lbs.	7,486	7,742
Sugar	"	58,890	59,756
Tea	"	10,915	11,026
Treacle	"	16,408	17,347
Beer	gals.	90,173	90,065
Porter and Ale	pts.	33,311	32,893
Wine	"	3,238	2,883
Brandy	"	2,997	3,058
Gin	"	182	165
Whiskey	"	595	601
Lemonade	bots.	81,732	79,200
Soda water	"	10,920	13,332
Oranges	No.	11,162	11,142
Lemons	"	6,908	7,206

From the above figures it will be at once seen that the stores and provision department demand a careful and thoughtful consideration, and that the steward and store-keepers of a large asylum must be provided with extensive conveniences, not only for stores, but also for the examination, weighing and for the reception and dispensing of the same, and these arrangements should be such that trades-people shall not necessarily traverse portions of the asylum occupied by patients. The stores should be approached in such a manner that the sexes, patients and attendants shall be duly separated.

It is a good plan in a general store-room to provide for a gallery on all sides, with a top light serving for galleries and ground-floor, thus leaving plenty of wall-space for shelves and cupboards, which space would otherwise be occupied by windows. On the ground-floor extensive counter accommodation is requisite, and there should be a shed or room for the reception of empty packing-cases, sacks, waste, etc. If the coal stores are near to the general stores, it would be advisable to provide a weigh-bridge, to carry about eight or ten tons, and this might well be near to steward's or store-keeper's office. The quantity of coal to be stored varies very much according to the distance of the asylum from the sources of supply, but a liberal provision of space should be made by the asylum architect and the supplies of house and steam coal should often be equal to at least a quarter of a year's consumption.

The following list shows the quantity of clothing and bedding used in one year in the Hanwell Asylum, where there is a total population of 2,111 persons, including attendants, but neither the preceding list or the following gives a complete idea of the infinite number of articles for which the architect must provide convenient storage-room.

HANWELL LUNATIC ASYLUM.

A RETURN OF CLOTHING, BEDDING, ETC., ISSUED.

MALES.	Year ending 31st December, 1889.	Year ending 31st March, 1889.	FEMALES.	Year ending 31st December, 1890.	Year ending 31st March, 1890.
Cloth and Cord Coats	753	733	Aprons and Pinafores	469	625
" Coats (locked)	....	....	Bed Gowns	328	344
" Waistcoats	641	672	Shifts	927	991
" " (tied)	4	9	Drawers	136	176
" and Cord Trousers	1,121	1,028	Stockings	1,8[illegible]9	1,845
" Capes	13	22	Handkerchiefs	280	289
Canvas Coats	4	10	Gowns	1,398	1,481
" Waistcoats	7	12	Flannel Jackets	405	425
" Trousers	7	10	Petticoats	907	917
" and Ticken Frocks	79	118	Cloth Boots	1,046	1,157
Flannel Drawers	398	289	" Shoes	81	97
" Jackets	763	590	Leather Boots	1,512	1,498
Handkerchiefs	2,852	2,755	" Shoes	343	348
Neckerchiefs	1,735	1,678	Shawls, Mantles, and Cloaks	490	550
Hats and Caps	1,235	1,406	Bonnets	823	900
Braces	326	366	Sun-hoods	157	163
Gloves	151	151	Caps	240	239
Shirts	1,299	1,347	Gloves	95	75
Stockings	1,693	1,794	Stays	263	249
Leather Boots	1,033	985	Velvet Boots and Shoes	....	....
" Shoes	26	27	Canvas and Ticken Frocks	34	35
Cloth Boots	742	740	Mattresses	250	199
Canvas Boots	2	4	Bolsters	56	92
Mattresses	127	102	Strong Rugs	71	69
Bolsters	105	59	Blankets	375	349
Strong Rugs	92	102	Rugs	207	187
Blankets	531	491	Sheets	687	686
Rugs	157	179	Pillow-cases	445	458
Sheets	563	555	Mackintosh Sheets	66	73
Pillow-cases	319	288	Canvas Bedsackings	227	213
Mackintosh Sheets	102	108	Towels	339	368
Canvas Bedsackings	71	66			
Towels	595	750			

The construction of the various receptacles for all stores must be such as to facilitate the immediate delivery of everything required, and with due attention as to heat and cold, dryness or moisture, or their exposure, or otherwise to the atmosphere.

In every asylum where female patients are kept, it is of importance that the laundry should be used, not only for its specific purpose, but also as a direct means of benefiting the patients and providing them with an employment tending in many cases to a relief or cure of their unsound mental state; for this reason it is often desirable to introduce machinery and labor-saving appliances but very sparingly, if at all, and where machinery is introduced to any extent, it must be very carefully protected and fenced off from the patients who might otherwise injure either themselves or others.

We find in the Hanwell Asylum, to which we have already referred, that 241 women were at one time employed in needlework, while 70 women were occupied in the laundries, with the addition of 9 male patients who were also engaged about the wash-houses. From this it will be seen that the laundry is looked upon in this asylum as an important occupation for the patients.

The laundry is usually under the direction of a laundry-mistress and a few laundry-maids, and is frequently divided into three departments; the general patients' laundry, the *foul* wash-house and the officials' laundry.

But in a very large asylum there may be separate laundries for each sex of patients, for each sex of officials, as well as a wash-house for foul linen, and provision for an infectious or fever wash-house in addition. Figure 5 shows an arrangement of the laundries.

Owing to the filthy condition in which many patients are often found, special precautions have to be observed, and a large portion of the clothing has to be cleansed in a separate apartment. A good plan is to provide a reception-room with a disinfecting-chamber, through which all the very foul linen must pass before it can enter the wash-house. This chamber should contain a steeping-pit, soaking-tanks, washing-tanks, strainers and rinsers, and one or more washing-machines. The garments thus cleansed may be then passed into the general wash-house.

The general wash-house should be provided with at least one receiving-room, but sometimes two are arranged, one for the clothing

of each sex. The fittings requisite, as shown in Figure 5, are sorting-bins, and one or more tables with space for baskets, etc. The large wash-house must be fitted with hydro-extractors, washing-tanks, strainers and rinsers, washing-machines and numerous troughs, liquor tanks, etc. Between the wash-house and the ironing-room there must always be an ample provision of horse drying-closets, heated by steam-pipes or hot-air. The ironing-room should have ironing-tables, ironing-stoves, calenders, mangles, etc.; beyond this there should be one or more delivering-rooms, with sorting-racks and space for baskets to be filled and packed.

The officers' laundry should have a separate horse drying-closet, hydro-extractors, washing-tanks, strainers and rinsers, and washing-machines, but unless the asylum be a very large one, it is not necessary to have a separate apartment for ironing and finishing. Tables, however, for this purpose should be provided in the officers' laundry. The architect must not forget that there should be ample space left for drying-grounds.

We do not here give a detailed description of the appliances, as the description of these will be better placed with the details of the fittings for the kitchen, sculleries, engine-room, etc.

The bake-house (see Fig. 4) should be so arranged that the whole of the firing-up can be done from the outside, in order to keep everything within clean and pure.

The fittings should include a sink, kneading-machines, working-boards, ovens (with or without rolling-plates to bring out a whole batch of bread) rack-shelving, tables and moulding-boards. Adjacent to the bake-house should be a room for cooling the bread, and it is a good plan to provide shelves framed so as to be movable on wheels, so that when the bread is once placed on the shelves to cool, it need not be touched until it is wanted, as the shelves with the bread on can then be wheeled right away to the bread-store, and the empty shelves returned in place thereof. The floor above the bake-house may be used as a flour-store, with hoppers for discharging the flour in given quantities below. Self-acting cisterns should be provided for the supplying of a defined amount of water to mix therewith. This arrangement avoids much manual labor, an object which the architect should ever have in view, unless there be a distinct advantage in making an occupation for patients who otherwise might be unemployed.

In our next paper we propose to describe other portions of the administrative buildings, the workshops, employment rooms, etc.

(To be continued.)

ITALIAN CITIES.[1] — IX.

VENICE. — I.

THE Italian Renaissance is not a phenomenon whose merit must be attributed exclusively to the aptitude of the inhabitants of Italy. The Italians are perhaps more highly endowed than any other people for entertaining grand intellectual conceptions for high artistic creations; this, at least, is what is generally said, but I profess to hold a different opinion myself. Without denying the peculiar capacities of this nation, I am profoundly convinced that each people can have its own manner of being artistic, and will be so when its hour comes. It was thought for a long time, for example, that the Swiss, so serious in political affairs, so practical, so positive, so active in commerce, so adroit in exploiting the natural beauties of free Helvetia, were incapable of conceiving and creating delicate works. They were reproached with the heaviness of their mountaineers, with that slow-moving spirit which is peculiar to people removed from the grand intellectual currents, and whose brains, possessed by narrow and unimportant preoccupations, cannot experience those warm impulses without which there can be no artistic life; and yet Switzerland is beginning to have a literature, a poetry, and the day may not be far distant when it will also have its art. In order that this phenomenon may arrive, it will only be necessary to await the moment when the Swiss temperament shall develop under the contact of civilizations which surround it; and when its native torpor shall be overcome by the labor and concentration, without which natures the best organized see extinguished those germs with which Providence has dowered them.

The Anglo-Saxon race, is it not itself in the same degree as the Helvetian people, a race practical and conservative *par excellence*, and yet it also has had, and for a long time, its painters, its poets, its musicians? Why? Because more open to contact with other races who have already an artistic past, more accessible by its education, its learning, to the souvenirs and intellectual traditions, which are, as it were, the classical source of inspiration, it has been able to give a free outlet to those faculties of idealization with which its character was provided. I am certain that, all question of heredity being set aside, what I say here of people I might also almost say of individuals, and that every man, exception of course being made of intellectual deformity, can be an artist after his fashion, on condition that he is placed amid favorable surroundings for the accomplishment of his metamorphosis, and that his being, habituated to living a corporeal life, may perceive horizons beyond which open the heavens which illumine our dreams.

That which has made the artistic glory of Italy, independent of the personal disposition of its inhabitants, is that it was placed at that spot of the globe where must converge all the grand human currents, and where must be made over anew the débris of civilizations that had passed away. After the Phœnicians, the Carthaginians, the Greeks, without speaking of anterior races, which brought to the West the first glimmers of Asiatic civilization, we have seen flow back toward the centre of the peninsula all the spoils which triumphant Rome had ravished from conquered races. It was in the southern part of the peninsula that came to meet its annihilation, after its defeat, the dying Greek civilization. But that which undeniably proves the truth of what I advance is the fact that the elements which have served to determine the Italian Renaissance remained during long centuries under the eyes and in the very hands of that people, which at the proper moment was to draw from them so marvellous a *parti*.

For how many ages have the Italian monasteries guarded under the dust of their archives Greek manuscripts, whose perusal formed the intellectual education of the humanists who have, without contradiction, been the fathers of poetry in Italy, and the precursors of the Renaissance! Were not those bas-reliefs, which served as models to Pisano, and whose study prompted that grand sculptor to give to sculpture a new direction, those bas-reliefs, without which, consequently, Italy would not have had, perhaps, a Michel Angelo or a Donatello, were they not in Italy for several centuries, when the grand Niccolo conceived the idea of examining them closely, of analyzing them, and from them, as it were, deriving a book of evangels for a new school? The Italian monks spent a long time side by side with these manuscripts, without suspecting their value, merely casting upon them disdainful glances. The stone-cutters, who blocked out the rude columns of old Byzantine cathedrals, seated themselves (who knows how many times) upon these very bas-reliefs, without suspecting that they were touching elbows with *chefs d'œuvre*, and that these broken marbles contained the germs of an artistic efflorescence which would make the glory of an entire nation and renew the genius of the Western world.

If the gift, the genius, which pushes a people towards artistic idealities were truly innate, as is pretended, in the inhabitants of the Italian peninsula, and must be considered the peculiar appanage of certain privileged nations, the abundance of subjects for inspiration should have forced the Italian people to have disclosed themselves long before, and the elements of study which they possessed in so great a quantity should not have so long a time languished uselessly under the vaults of a great number of monasteries and on the grand roads where the precursors of the Renaissance remarked them when the real hour sounded.

As we have said, each race must or can be artistic at its proper time. The maturing of artistic faculties is a phenomenon which follows the ordinary laws, and, just as the quality of a grain and the fertilizing nature of the ground are not everything by themselves without the rotation of the seasons, which must second the vegetation of the plant which is to sprout, so it is necessary, in order that the artistic temperament of a nation may develop and bear fruit, that the revolution of the historic seasons shall be accomplished, and the intelligence of its people be submitted to climacteric conditions which may determine its complete maturity. We may, while sharing the same theory, establish the principle that there is never anything fatal or preordained in the fashion in which this maturing is accomplished, and that the artistic orientation of a people will be modified, will be transformed, will take the most opposite directions, the most scattered, according to the changes which are produced in its historic surroundings. Therefore, there must always be welcomed with a certain distrust classifications of schools by rank and nationality. These classifications are, perforce, empirical, and for this very reason erroneous and devoid of all value. I have, for my own part, the custom of shrugging my shoulders whenever I hear mentioned Italian art, French art, Spanish art, and so on. There is no real truth in these denominations, except this, that at a certain time there were in Italy, in Spain, in France, artists who did remarkable work; but it does not result that the manner in which these works have been conceived and executed was, so to say, an organic derivation from national characteristics. On the other hand, it would be easy to prove the contrary by the simple reason that a man of genius — that is to say, a grand artist — is great and is a genius just because he does not resemble the general run of men amongst whom he was born, and that, consequently, he would be all the more admirable if he were farther removed from them. In a word, Italians, Frenchmen and Spaniards will have genius and be really great men precisely because they raise themselves above their compatriots, and because they still more cease to resemble them, and their works will be the more appreciable because they are superior to those which their contemporaries, born under the same sky, are able to create.

Is it not ridiculous, then, to speak of Italian art when designating a patrimony and an artistic cycle which comprise epochs and kinds of manifestations of such diverse character, having so little resemblance one with another? What bond of kinship, for example, can exist between the Neapolitan school and the Florentine, between the Roman and the Venetian, between the Lombard and the Siennese, between the Mantuan and the Umbrian? The truth is, that when a citizen gives birth to a *chef-d'œuvre*, accomplishes one of those prodigies which have the virtue of enlarging the horizon of human intelligence, he ceases to be a citizen, and becomes a mere man.

[1] Continued from No. 707, page 17.

He issues out from his native country to enter into full humanity — to penetrate to that radiant and star-lit country to which belong all the *élite*.

At no place better than at Venice can be encountered the evidence of the truth of this thought which I have just formulated, which, unfortunately, is not shared by those who do not know how to criticise art and history without mixing up with it the preoccupations of Chauvinism. If one would sound the depths of that which is called in the official *ateliers* "Italian art," it would not be difficult to prove that the splendors of the Renaissance are in great part the fruit of foreign importation, and that, to speak only of architecture, the action, the instruction and the participation of master-builders from Germany prepared the way for Italian architects who have filled their country with admirable works. Jacopo, surnamed Lapo, the father of Arnolfo di Lapo, author of Santa Maria del Fiore of Florence, was a German by birth, and also the greater part of the architects whose names are not known to us, and to whom we owe all the monuments whose foundations were laid in Italy before the twelfth century, amongst others, of the magnificent Cathedral at Milan, the Tower of St. Mark's at Venice, and the Leaning Tower at Pisa. These great artists were so little infatuated with their works that they did not even take the trouble to engrave their names on the stones of the buildings which they constructed, but created for the mere pleasure of creating, without vanity, without even having the knowledge of the real grandeur of their creations — very different in that from our times, when one is very easily induced to believe that he has genius, that he has created a *chef-d'œuvre*, so that the slightest trinket, in consequence, now bears the signature of him who designed it.

That art is everywhere a phenomenon of transition, a transplantation, may be perceived in the influence that the Egyptians exercised over the Greeks, in that which in their turn the Greeks exercised over the Romans and, more especially in architecture, in that which the Germans exercised over the Italians, and these in their turn, at different epochs, over the French, the Spaniards and the Flemings. In architecture the exotic imprint has remained more visible and more living than in all other manifestations of art, and, after having been, according to the Grecian formula, transmitted by Vitruvius, Doric, Corinthian or Ionic, the Italian style had become, at the beginning of the Renaissance, Gothic; that is to say, German or Scandinavian. When later there arose what may be called the Italic style, Tuscan or Florentine, this style was, in sum, only a mixture of all the formulas since the primitive Etruscan formula down to and including the Roman, the Greek and the Gothic.

Nationalism in art is, then, an improper term; for the flowering of art is a phenomenon which depends on an infinity of influences which are in the air, which come from on high and from afar, absolutely as the fertilizing of certain fruits is brought about by the action of breezes which have crossed the oceans, and which bear from the remotest regions the fertilizing elements with which they are impregnated.

It is especially at Venice that the truth of the theory which I have just formulated declares itself to the eyes of an attentive observer. Art at Venice has no style of its own, properly speaking, because it has all styles. When one has said Venetian art, one has expressed a vague definition which does not answer to a reality. Venice was that point of Europe where the Orient and the Occident met. It was the last limit where occidental civilization could still believe itself at home, and where oriental civilization began to feel itself expatriated. From this shock of two worlds, each of which comprised in itself several worlds, was born a proteiform art, fantastic, bizarre, inharmonious, without rule or regulation, and which pleases just because it surprises, and because it puts to rout him who searches to unravel its law and synthesis. This mixture has been all the more complicated and vast, has produced results all the more prodigious and inexplicable, because each of these two worlds already united the fruits of association and the fusion of several scattered elements.

The Occident brought to Venice the Roman tradition, issue of Etruscan importation, bastardized, embellished and completed by the most recent influences imported from the north under the cover of Gothicism — this same Roman tradition, in whose depths slumbered the reminiscence of Greek art which, after a long detour and after having traversed the peninsula from south to north, came to join the true Greek art of which the Venetians had gone in search to Attica and the Peloponnesus, and of which this reminiscence was only an emanation. And, upon its side, the Orient did not only bring into the City of St. Mark the revelation of Hellenic art, but it called to her all the *défroque* of Byzantium, the theory of that Byzantine art which was born of the shock and mixture of all the dreams of the Orient, of the fusion of all the conceptions ripened in the depths of Asia and in the burning plains of Africa, of all the thoughts, of all the dreams born of Arab, Moorish, Assyrian, Phœnician and Egyptian genius. All this is met with at Venice, and from this fusion was born a city the most unique in the world, which has the specialty of exceeding in reality all that the imagination can conceive. There is no traveller who has not experienced on arriving in a grand city a cruel undeceiving. The human imagination is so fertile that it is easy for it to embellish the things that may be seen — thanks to dreaming of the marvels which one is going to visit, and rendering them more beautiful than they really are; when he arrives he discovers with some bitterness that the reality is much more commonplace than he had dreamed.

[To be continued.]

HADRIAN'S VILLA.

AFTER Trajan, Hadrian's name stands prominently forward in connection with the arts. He restored many of the ancient temples which were falling to decay; he erected others in a style worthy of the best ages of the art; he completed the temple of the Olympian Jupiter at Athens, and enriched it with a statue of the god in gold and ivory. But the most extensive of his works in relation to the arts was the construction and storing of his celebrated villa, about eighteen miles from Rome. It is almost impossible to read any account of ancient sculpture without finding some mention of Hadrian's Villa, for the sculptures discovered there have been immense. It will not, therefore, be out of place to see what sort of place this may have been in its best days. This villa was built on the plain at the base of Tivoli, about eighteen miles from Rome, from the designs of the emperor, mainly to contain the treasures of art which he had collected. When first built it more resembled a city than a villa, for it is said by some antiquaries to have been eight or ten miles in circuit; but this statement is a little too much for modern credence. But it is, nevertheless, certain that in no other part of Italy is there a mass of ruins of such amazing extent. Instead of being merely a villa, as we now understand the term, it comprised a lyceum, an academy, a pæcile, a vale of Tempe, a serapeon of Canopus, a stream called the Euripus, a library, barracks for the guards, elysian fields and numerous temples. Many of these were imitations of celebrated buildings, or places elsewhere, and Hadrian seems to have wished to concentrate all the luxuries possible within this his unequalled country house. It was embellished with all the finest works that could be procured, whether the productions of ancient Greek artists or of those of his own time. Some of the most interesting and valuable remains of antiquity have been discovered there, and even at the present day every fresh excavation that is made among these ruins restores to the world some object of interest. Some of the Egyptian superstitions having been introduced into Italy about this time, they were mixed up with the existing forms of worship, and the gods of the Nile were admitted among those of the Romans. The example of the capital was soon followed by the smaller communities, and as the new worship was extended over the whole empire, a great demand arose for statues and other symbols of Egyptian deities and ceremonies. The imitations of Egyptian figures and subjects which are found in Italy, and which particularly abounded among the ruins of Hadrian's Villa, may be assigned to this period. The specimens of sculpture of the time of Hadrian that are preserved in modern collections are evidence of the high state of the arts. The statues and busts of himself and of the emperors who immediately preceded and followed him, as well as the portraits of Antoninus and Lucius Verus, exhibit qualities that would do honor to the best ages of Greek sculpture. There are two statues of Antinous in the museum of the Capitol, one treated in the Greek style entirely naked and the other with Egyptian attributes, which are particularly worthy of notice from the simplicity and beauty united with grandeur that pervades them. It was by the orders of Hadrian that a change was wrought in a law concerning the portraits of private individuals, and which change led to the fashion of having portraits in statuary in the houses of all the noble and opulent citizens. In the villa at Tivoli, Hadrian placed the statues and busts of his living and deceased friends. The favorite architects employed by Hadrian in his great works were Apollodorus and Detrianus; but all attempts to discover the names of even a few among the many sculptors who must have been employed by him have proved unavailing. How far Hadrian may be termed the Pericles of Roman art, it would be difficult to say without knowing the degree to which he encouraged native artists to add to stores already existing; but he certainly seems to have been the most munificent patron of art that Rome ever had. With him the great impulse ceased, and neither the patronage nor the skill seem ever after to have been forthcoming to so great a degree for the production of fine sculptures. — *The Architect.*

SOCIETIES

SKETCH-CLUB OF NEW YORK.

THE regular September meeting of the club was held at Delisle's Roof Garden, Central Building, Saturday evening, September 2d. This was the first monthly meeting after vacation and there were about thirty present. Mr. Edward L. Tilton, of the firm of Boring & Tilton, was the guest of the evening, addressing the club on the subject of travelling in France and student-life at the École des Beaux-Arts. Mr. Louis Mullgardt, President of the St. Louis Architectural Club, was also present and spoke. Mr. Clarence S. Luce said a few words about club competition and told a story, and Mr. H. Klingenfeldt entertained the members with a song. The next dinner, to occur the first Saturday in October, will be held in the new club-room, 1473 Broadway, near 42d Street. There will then be an exhibition of summer sketches and the occasion will be made a house-warming for the new quarters.

EDGAR A. JOSSELYN, *Recording Secretary.*

ILLUSTRATIONS

[*Contributors are requested to send with their drawings, plans and a full and adequate description of the buildings, including a statement of cost.*]

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[Gelatine Print.]

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STRASBOURG, AFTER A DRAWING BY SAMUEL PROUT.

COMMUNICATIONS

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LIVE LOADS IN OFFICE-BUILDINGS.

Denver, Colo., August 30, 1893.

To the Editors of the American Architect:—

Dear Sirs,—I was much interested in reading the article on "Live Loads in Office-buildings," by Mr. Blackall, in the last number of the *Architect*, as it gives practical facts and is in line with what I have been advocating for years, viz, that all calculations for building construction should be based on the *probable* conditions, rather than on those that are possible. In regard to the requirements of the building-laws of the cities of New York and Boston relative to the live loads on dwelling-house floors, I consider them positively absurd, and I believe that such laws do more harm than good. It always seemed to me that such provisions should be in conformity with reasonable conditions, and then should be strictly enforced. A law which is over-strict is seldom respected or enforced.

Yours truly, F. E. Kidder.

NOTES AND CLIPPINGS

A Ruined Capital of Siam.—The remains of the old capital of Siam, Ayuthia, which was taken and destroyed by the Burmese in 1760, are on the banks of the Menam, about 120 miles above Bangkok. Ayuthia, which, from the glowing description of writers of the seventeenth century, appears to have been one of the richest and most populous cities in Farther India, was founded in 1350 by a prince who migrated from the North. Joest Schouter, a Dutchman who lived in Ayuthia for eight years, just two centuries and a half ago, never wearied of telling of the great wealth and commerce of this ancient capital of Siam. He described the place as being laid out with several broad streets, intersected by numerous canals and possessing hundreds of large and splendid temples. It measured eight or nine miles in circumference, exclusive of suburbs, and was protected by a thick stone wall, which, in the estimation of the Dutchman, made it impregnable. That this was not the case was proved in 1768 when the Burmans, after a two years' siege, took the town and destroyed it. Deluges of rain, followed by blazing heat, have reduced a once large and magnificent city to a dismal, howling waste. The view from a remaining tower is dreary enough. Where once were canals crowded with shipping and streets teeming with a busy population can now be seen only clumps of green bamboo and wild shrubs, forming in many places an impenetrable jungle. All vestiges of houses have disappeared under the rank tropical growth as completely as if they had never existed; but the site of former magnificence is attested by the numerous ruined and broken towers and pagodas springing up here and there, half smothered and choked by the closely clinging vegetation.—*New York Tribune.*

Penny-in-the-Slot Gas-meters in Liverpool.—Automatic gas-meters which are put in operation by dropping a penny (two cents) in the slot are in use in Liverpool, England, and the Liverpool *Mercury* says that the device has come into very popular favor. In 1890 over 100 meters were at work in Liverpool, and from that time until now the difficulty is said to have been to construct the machines quickly enough to supply the enormous demand which now exists. In 1891 the company fixed 1,975 meters, in 1892 it fixed 4,038, and now in Liverpool alone there are between 8,000 and 9,000 automatic meters in the houses of those who hitherto have had to depend upon candles or oil for the illumination of their homes. Like every other invention, the automatic gas-meter has since its initiation been subjected to various improvements. In its latest form there are in view of the householder three dials marked: "L," "S" and "D," and as soon as a penny is dropped into the slot the hand of the "D" dial records it. When twelve pennies have been dropped in, the "D" dial stands at "O," while the hand of the "S" dial records that one shilling's worth of pennies are in the drawer, and so on, until £20 ($100) worth of gas is paid for. The hands can only move one way, so that by this invention the householder practically gets an indisputable receipt for the pennies he puts into the slot and the total amount he has paid for his gas. An indicator shows how many feet of gas are in the meter "paid for, but unconsumed." When all the gas paid for has been used the flame does not at once go out; but under a new arrangement the meter automatically warns the householder that the supply is nearly exhausted by gradually lowering the flame at least one hour before turning the gas off. It is to be hoped that the dials record more accurately than those of the ordinary gas-meters are popularly supposed to record the quantity of gas.—*Exchange.*

The Meaning in Architectural Foliage.—To many persons in their cursory notice of architectural foliage, stray instances of an underlying meaning must occasionally have presented themselves. The Egyptian had used the lotus lily to bear the beams of his tenple, binding its stalks together for the model of his pillar and forming its capital after the flower, probably with definite symbolic intent, for a water lily scarcely suggests itself as suitable for forming a column; we know, however, that that plant was a sacred emblem to him, constantly placed in the hands of his divinities, and interwoven with traditions of Horus and the Sun, and knowing this its use becomes reasonable and interesting. Although the Greek acanthus would seem to have no such fact to support it, yet the legend of its origin bears something of the same spirit. The architect Callimachus is said to have gone to visit the grave of his daughter, upon whose tomb he had previously placed a basket of flowers; the brankusine meanwhile had sprung up about the tile upon which the basket stood and encircled its fine lattice with its luxuriant herbage, and this visit the artist immortalized in the Corinthian capital. To the Roman mind, however, this local circumstance does not appear to have been of sufficient moment for such a position of importance, and in their capitals after this order they employed far more (according to Sir William Chambers and Mr. Ralph N. Wornum, who studied the question,) the olive and laurel and parsley, foliage sacred to Minerva, Apollo and Hercules. And in Christian architecture the same intention may have prevailed. Sir Walter Scott's mind seems apprehensive of something of this kind being the case in the stonework of "St. David's ruined pile," when, speaking of the monks' garden, he says:

> "Spreading herbs, and flowerets bright,
> Glistened with the dew of night;
> Nor herb, nor floweret glistened there,
> But was carved in the cloister-arches as fair."

—*The Contemporary Review.*

The New York Aquarium.—The old historic fortress known as Castle Garden, situated on the extreme point of land at the south end of the city, where the waters of the Hudson and East Rivers unite, is now transformed into a free aquarium. The legislature appropriated $150,000 to pay for converting it, under the charge of the Park Department. The building has been remodeled by Mr. H. T. Woodman, a scientific aquarist. Round the walls and beneath a light circular gallery are two ranges of brick wells, which will form the tanks, and beneath the dome in the centre of the building is a large central tank, which will in time become the home of a white whale or grampus; and six small tanks around the centre tanks will be used for sharks, seals, etc. There are thirty-six side tanks in all, which will be lined with white tiles and faced with plate glass. In the gallery eight-four small tanks will be placed. Great care is taken with the lighting, which is accomplished by means of skylights. Special tanks are provided for the blind fishes, and experiments will be carried on to see if the blind fishes will not, on favorable conditions, recover their sight. Abundant supplies of fresh and filtered salt water will be provided. The three great aquariums of the world are situated at Naples, Brighton and Berlin. The present aquarium, is much better equipped than the Berlin aquarium, and will doubtless in time rival the other two great aquariums. It is a valuable acquisition to the city.—*Scientific American.*

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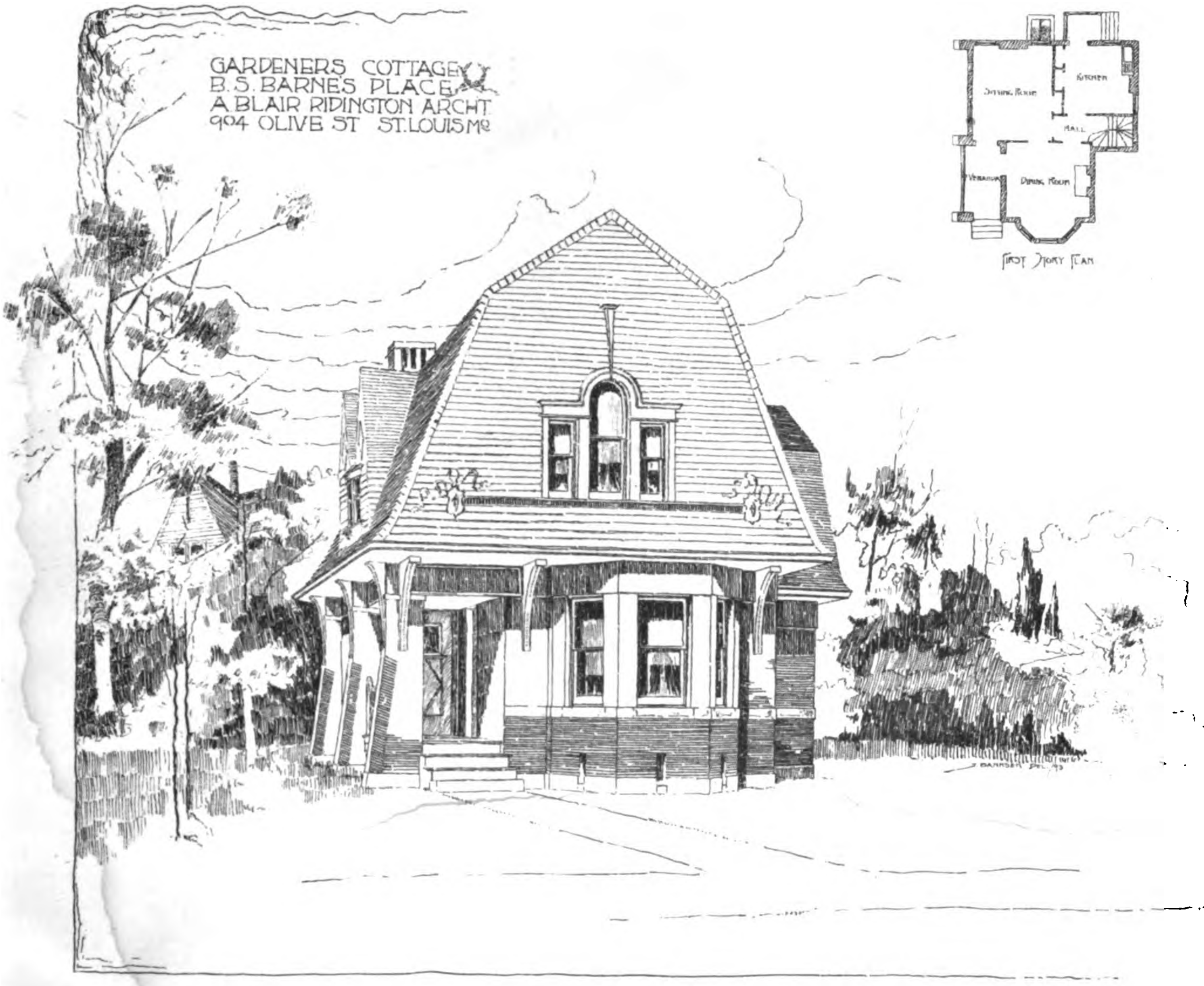

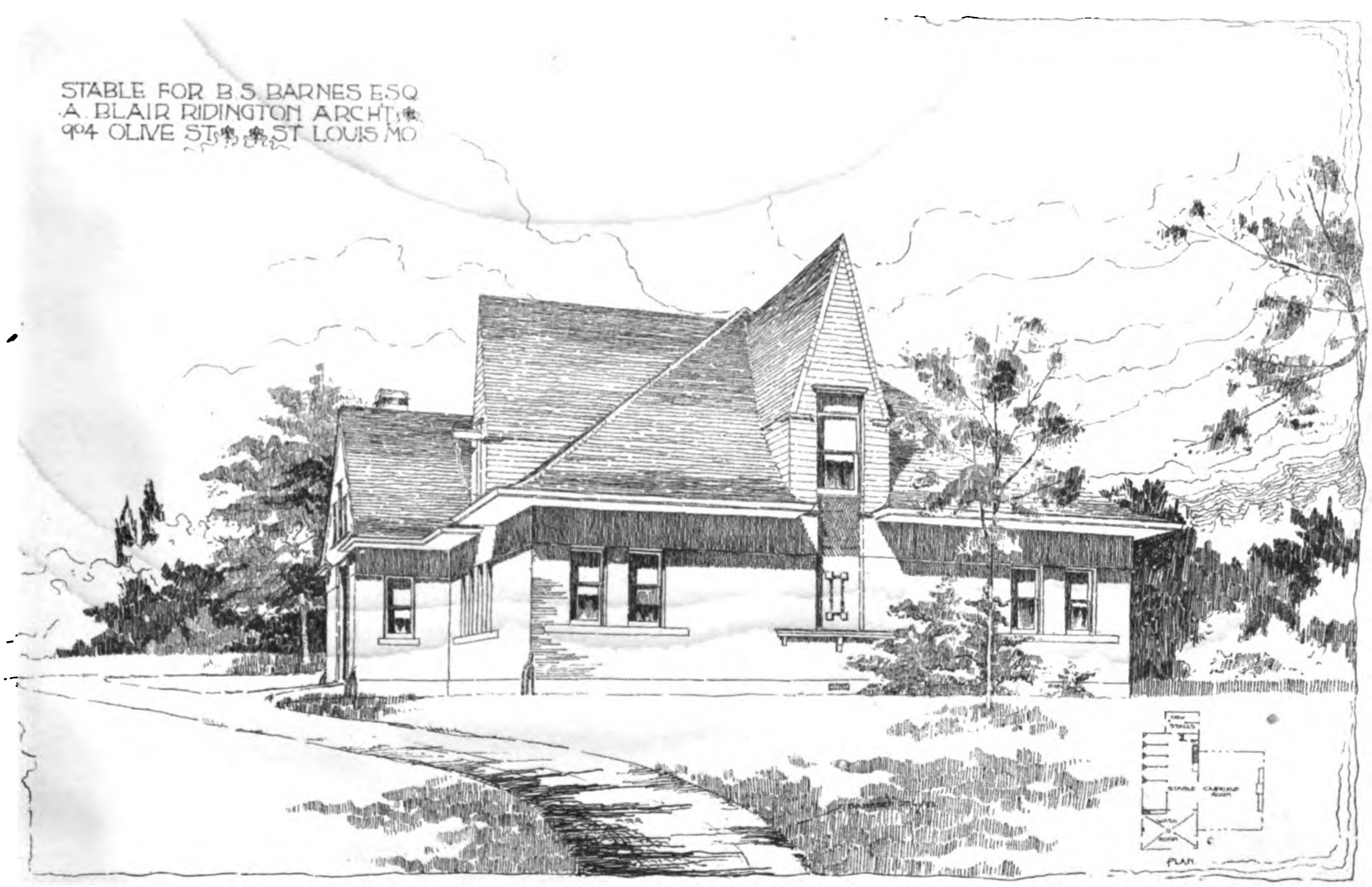

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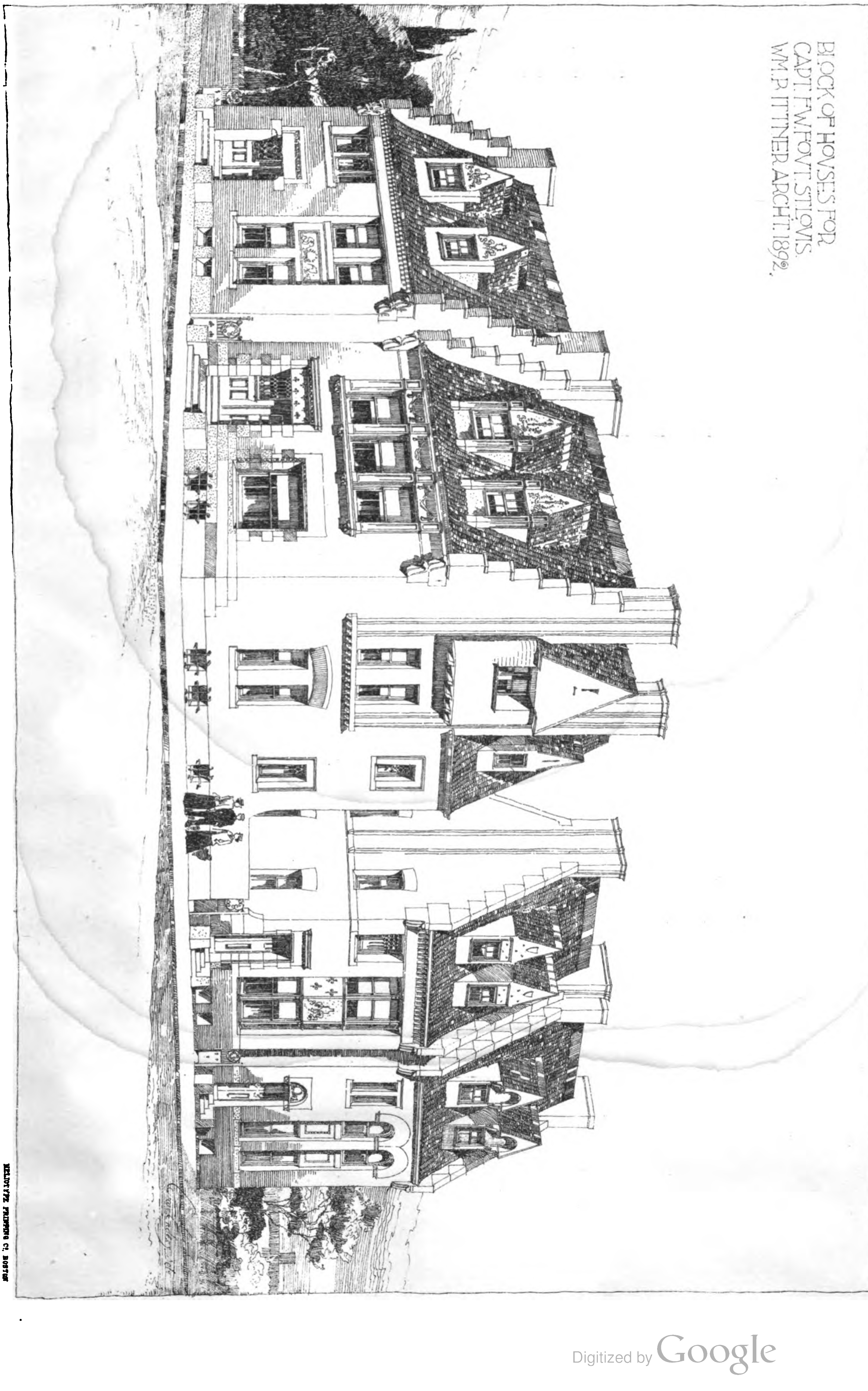
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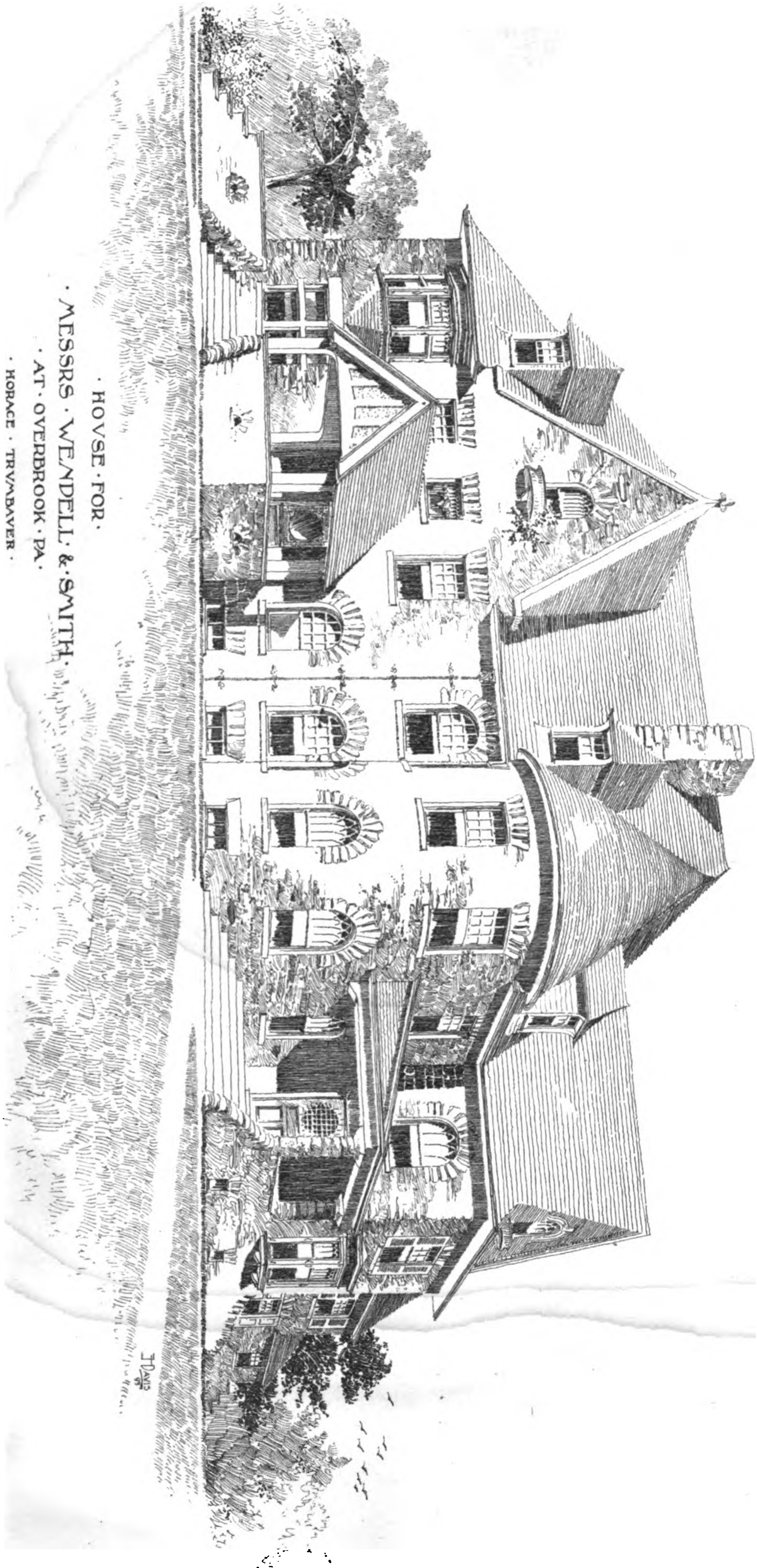

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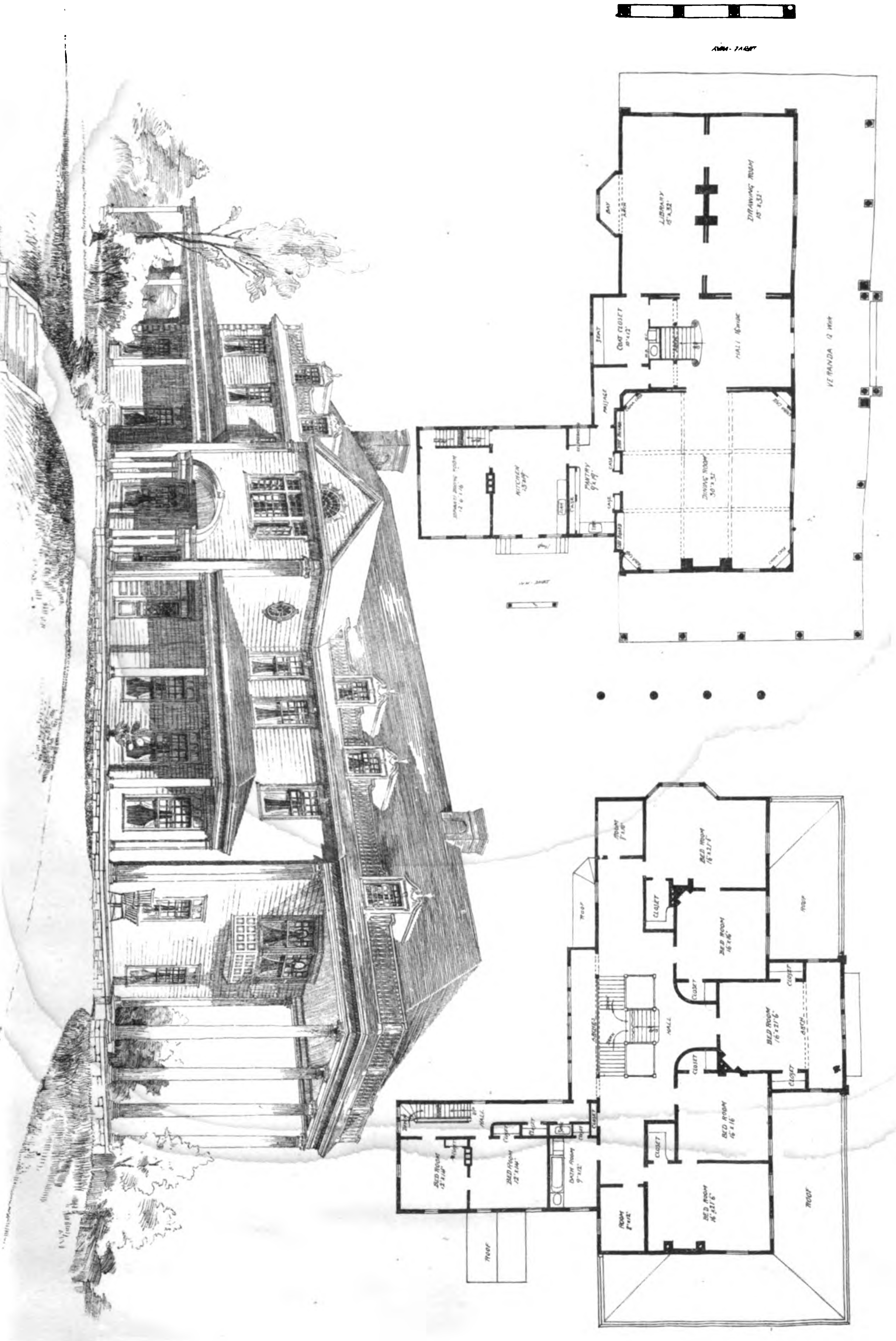

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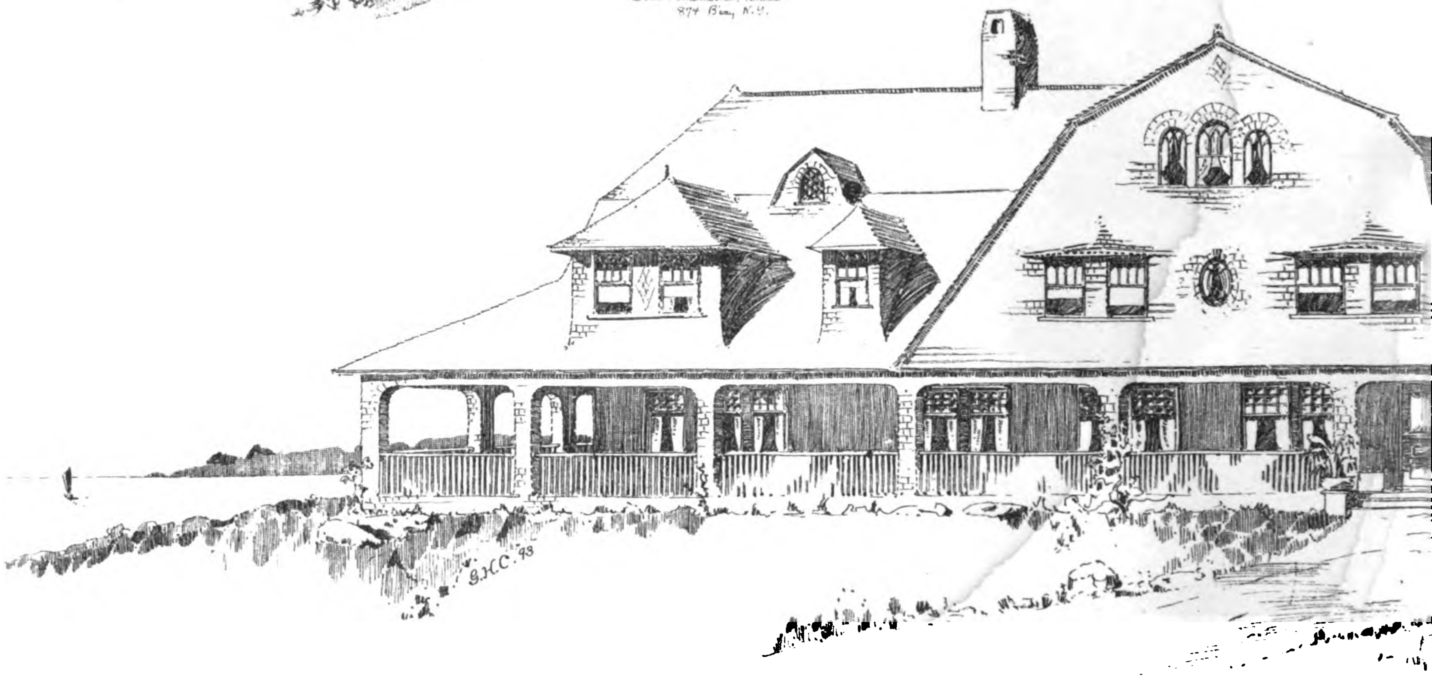

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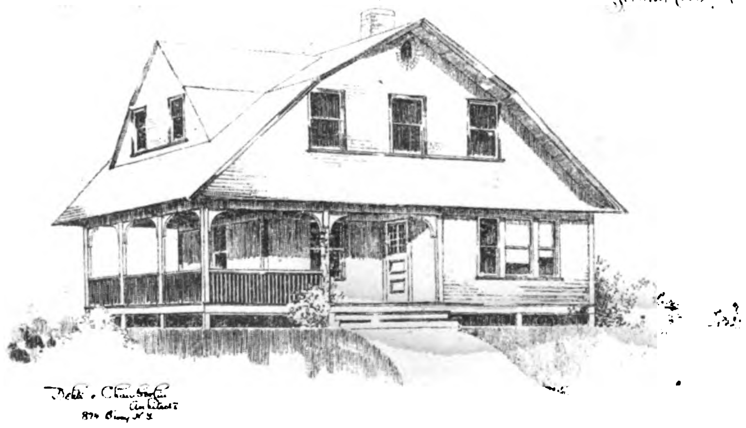

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SEPTEMBER 16, 1893.

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FOR so many-sided a man we have often been tempted to consider Mr. Edward Atkinson one of the most curiously one-sided men ever created when it comes to his considering those matters which fall under the direction of architects. The fact that architecture is a fine art and has to do with other structures than one-story mills has sometimes seemed so difficult for him to grasp that we were genuinely surprised to discover what an impression the architecture of the World's Fair buildings had created on his Philistine soul. But though, as will be seen elsewhere, he confesses that the architects have done their task admirably, his habit of finding fault with architects — a fault-finding in many respects justifiable and which has produced beneficial results — leads him to make complaints which are rather ill-timed and are contradicted by the very concessions he makes. To declare that "the whole architectural display is wonderful, beautiful and satisfactory within its purpose," that "the purposes of a great show are fully met in a high sense" is to make as strong statements as could be framed that the aim and purpose of the architects had been ably and effectively carried out. Then why should they be blamed for not having satisfied other aims and purposes which they were not called upon to fill? The World's Fair was not designed to be a "true industrial exhibition," as to do that would but be to call down certain failure and loss upon the projectors. We do not believe there are enough people in this country who could be interested in such an industrial exhibition as Mr. Atkinson and a limited number — ourselves amongst them — would like to see, to assure an income from attendance that would save the undertakers from ruin. No, a world's fair, to be successful, must always be a fair and the elements of the retail shop, the bazaar and the side-show can never be eliminated. A greater amount of thoroughness and completeness in the way of preparing and setting-up the industrial exhibits is desirable, but not to the extent of turning the Machinery Building into a succession of barrack-like shops and factories, full-size and in complete operation. As to Mr. Atkinson's prediction that in the next seven years "we may have exhausted the age of timber, of iron and of steel in the art of construction," all we can say is that we hope to be alive in 1900, to verify the truth of his supposition.

AN accident, very much resembling that which occurred in Washington a few years ago, and apparently due to the same cause, took place lately in Germany. The Government is building a garrison church at Hanover, from the plans and under the direction of an experienced architect. The nave, choir and transepts, including the tower over the crossing, were roofed in, and the two western towers were up nearly to the base of the spires, when, about five o'clock in the morning, one of these towers collapsed, bringing down with it most of the western end of the church, but leaving the sister tower standing. Fortunately, no one was injured. The church is built in part over the old city moat, so that the foundations of the western towers extended through the filling of the moat, to the virgin soil beneath, a distance of about twenty-five feet. For material, coursed sandstone rubble was used in the foundations, laid in cement mortar. The tower walls above ground were specified to be of roughly squared sandstone, with facing of coursed limestone rubble, and the other walls of brick, with limestone rubble facing, all the walls above ground being laid in lime-mortar. The walls appear to have been thick enough, and might perhaps have stood, if they had been built according to contract, but it is said that the greater part of the walling was laid with common rubble, with no pretense of coursing. When it is considered that the towers were built rapidly, and that the lime-mortar could hardly have had time to harden, it is not surprising that one of them should have fallen.

VERY few people, even among architects, have an adequate conception of the part which the mortar plays in rubble masonry. While walls of squared stone, or even of good coursed rubble, are nearly as strong without as with mortar, a wall of irregular rubble depends on the mortar for its very life. Many a wall of this sort would at first be more secure if laid dry than in lime-mortar, as the friction between dry stones helps greatly to keep them together, where fresh lime-mortar acts as a lubricant, aiding the stones to move on each other, and exerting little cohesive action; yet, if the mortar is of proper quality, it forms ultimately so strong a bond between the stones that a rubble wall in such mortar is, in the end, little inferior in strength to one of cut-stone. There is plenty of evidence of this in the churches of the English chalk district, which are generally built of flints. These are stones about the size of one's fist, rarely as large as a child's head, very hard and smooth, and about as nearly spherical as natural stones ever get to be. It would be next to impossible to lay a dry wall of them, with vertical sides, four feet high, yet there are scores of lofty towers built with them, which, without other assistance than that of the good lime-mortar in which they are laid, have stood in perfect condition for six hundred years. In these walls, the mortar is accepted frankly as the most important part of the construction. The joints are very thick, as they should be in all rough rubble masonry, and the flints form rather the aggregate of a concrete mass than the main element of the wall, as would be the case with squared blocks. Probably, our English ancestors either worked very slowly, so as to let the mortar harden in successive small portions of wall before straining its tenacity with a superposed load, or used some method of hardening it quickly which is unknown to us; but that they could not have carried up their walls more than a few feet at a time without allowing the mortar to harden is certain. We, however, possessing the inestimable advantage of cement, which gives us a matrix at once adhesive, strong, incompressible and quick-setting, can do with rubble what we will, and, if we would only use our materials as intelligently as our ancestors did, we might utilize an immense amount of small stone, which is now thrown away, and at the same time secure some novel and picturesque effects in our buildings.

PEOPLE who have driven through the Bois de Boulogne will probably remember the "Croix Catelan," which, although not a cross, but a pyramid, is supposed to have been erected about the year 1700 on the site of a memorial cross, dating from the middle of the thirteenth century. What was the person or thing commemorated by the original cross, and, consequently, who or what it is proper to think of in contemplating its modern substitute, has been much disputed. The favorite legend is that a troubadour, named Arnaud Catelan, loved the princess Marguerite of Provence, and, when she left the South to become the wife of King Louis the Ninth, followed her on foot, carrying with him some verses, and a few faded Provençal flowers, as a wedding gift. When he arrived in Paris, the king and queen had left their

castle of the Louvre, and were making a visit to the king's native town of Poissy. The road from Paris to Poissy, though only fifteen or sixteen miles long, lay through the Bois de Boulogne, then called the Forest of La Rouvraye, which was infested with robbers, and the officers of the castle gave Arnaud an escort, to conduct him safely through the wood. On the way, Catelan, rejoiced at being so near the end of his journey, made a confidant of the captain of his escort, and showed him the little box which, as he said mysteriously, contained treasures to be offered to the queen. The captain apparently thought that the queen had treasures enough, and that this would be an excellent opportunity for enabling her to share some of them with her subjects; so, when they reached the depths of the forest, he and his men fell upon the troubadour and slew him, and gained possession of the precious box. On opening the case, to get out the jewels which he supposed it contained, he was disgusted to find nothing in it but some sentimental verses, and a packet of dry flowers. The verses he threw away at once, but the flowers had an aromatic scent which pleased him, and he kept them to perfume his clothes on state occasions. The corpse of the poet was soon afterwards found in the wood, but there was no clue to his assassins, and a prolonged investigation revealed nothing. One day, however, Queen Marguerite held a reception, and the captain of the escort appeared to pay his respects to his sovereign. As he approached, the queen recognized the fragrance of Provençal flowers, and a suspicion came into her mind. Officers were sent to search his habitation, and more relics of the troubadour were discovered. The captain was seized, with others of the poet's escort, and they were all roasted over a slow fire, while the king and queen had a stone cross set up on the spot where the unfortunate Catelan had met his death.

THERE is, in Paris, a society of nineteenth-century troubadours, known as the "Compagnie des Félibres Parisiens." To such a company, the tomb of an illustrious predecessor, particularly one who had lived and died so romantically as Catelan, would naturally be an object of the highest interest, and this year, in order to give special brilliancy to their proceedings, they held around it a Court of Love, of the most approved Mediæval pattern. They recited Provençal verses, crowned Queens of Beauty, and related fables, all in the traditional manner, and with such success that the Croix Catelan is likely to be adopted as the special representation of Provence in the Parisian Metropolitan district. It is true that the legend of the troubadour is gravely questioned by historians, but the popular feeling will always be on the side of the poets, and, before popular feeling and poetry together, mere prosaic fact is not of much account.

THE Indian section of the South Kensington Museum has just come into possession of a carpet, which must be well worth seeing. The carpet, or rather rug, once belonged to the mosque of Ardebil in Persia, and, according to an inscription wrought into it, was made by Maksond of Kashan, who calls himself "the slave of this holy place," in the year 942, corresponding to the year 1535 of the Christian reckoning. It is about thirty-four feet long, by seventeen wide, with a dark blue centre, covered with a network of flowers, mostly in red and yellow. The pattern consists mainly of a circular central medallion, from which radiate sixteen panels, or cartouches, a quarter of the same being repeated in each corner. According to the *Builder*, the carpet is "faded." The most curious thing about the account is that the South Kensington authorities had not money enough to buy the rug, and private individuals subscribed what was necessary to make up the sum required. We are not told what this sum was, but it would be interesting to know how much the India Museum and its friends were willing to pay for a faded old carpet. The few tourists who find the Indian Section at South Kensington certainly do not observe either poverty or parsimony in the appearance of the exhibit. To say nothing of the enormous carpets of silk and camel's-hair, the display of jewels is, with the exception of the Regalia in the Tower, perhaps the richest in Europe. As we recollect it, a favorite decoration for the objects shown consisted of an inlaid vine, something like a myrtle, with stems of gold, leaves of emeralds, half an inch long or so, and flowers of rubies of corresponding size; and we remember particularly a good-sized teapot of jade, inlaid with a vine of this description, and having a diamond, as large as a marble, as a handle for lifting the lid.

THE introduction of the basic converter first gave an impetus to iron manufacture in Germany, which has an abundance of impure ores containing phosphorus, suitable for the basic process, but useless for any other. In addition to this, a process was invented in Westphalia for removing sulphur from raw iron by means of manganese, so as to bring another class of ores, formerly considered worthless, into use. Being thus in a position to use their own ores successfully, the Germans set themselves to improve the processes which they were henceforth to use. The greatest of their recent improvements of this sort consists in reducing the cost of coke, the indispensable fuel for iron metallurgy, and one, also, which has been comparatively high in price in Germany. Their theoretical science taught them that, in manufacturing coke from coal, hydrocarbon gas, ammonia and tar are driven off, all of which would be valuable if they could be saved; but the nearly unanimous opinion of experienced iron-workers was that these products could not be saved without greatly injuring the quality of the coke. However, the Germans prefer, instead of practising first and theorizing afterwards, to get their theory right to begin with, and bring their practice up to the theory. Theoretically, there must be some way to save the waste-products from the coking-ovens without spoiling the coke, and they set themselves to find it. Within the past five years, Mr. Mason informs us, probably three thousand coking-ovens have been put in operation in Germany, which save the waste-products. Of these, the more recent and effective are those known as the Otto-Hoffman ovens, of which 1,550 are now in use. These consist of ovens, or retorts, 32 feet long, 16 inches wide and 5½ feet high, grouped, in the best examples, in batteries of sixty, and connected with a Siemens regenerator in such a way as to utilize the surplus heat for warming air, to be subsequently driven, at a temperature of 1800° Fahrenheit, into the furnaces, to be there mixed with hydro-carbon gas and burned. Each oven is charged from the top, and contains 6¼ tons of coal. As it is heated, crude gas and vapor are disengaged, which, instead of being allowed to go to waste, as in ordinary coking-ovens, are drawn off by a suction-fan and driven through coolers and scrubbers, where the tar and ammonia are retained in the water through which the gas is made to pass. From these purifiers, the gas is taken directly back to the fire-boxes under the ovens, where it is mixed with the heated air from the regenerators and burned for roasting the coal. The supply of gas is, with all the German coals, more than ample for this purpose, and the surplus is used for lighting the works and producing steam. The water in which the tar and ammonia have been retained is treated by decanting the supernatant portion, containing the ammonia, leaving the tar in shape for immediate use, while the ammonia is recovered by heating the water and condensing the ammoniacal vapors with sulphuric acid. Average German coal furnishes about 76 per cent of coke, 1¼ per cent of ammonia, and 2½ to 4 per cent of tar, the remainder being gas and water. As the sulphate of ammonia is worth about 2½ cents a pound, and tar half a cent, while the gas takes the place of coal for heating the retorts, it is found that a battery of sixty ovens, besides saving, on an average, eight thousand tons of coal a year, as fuel, over the old process, produces eight hundred tons of sulphate of ammonia, worth about forty-two thousand dollars, and three thousand tons of tar, worth about twenty-eight thousand dollars, all of which would, by the old processes, be wasted. As the coke produced is of the very best quality, there is no counter-charge to diminish this immense saving, which is said to amount to 40 per cent of the cost of coke-making. Very recently, a Dortmund inventor is said to have separated benzole directly from the coking-gases, and, as benzole is a valuable and staple product, being the foundation of the aniline colors, a still further economy may be made. In addition to these signal triumphs of educated theorizing in metallurgy, Mr. Mason points out that the Germans have an advantage over their competitors in their systematic economy of coal. The dust, which with us is thrown away, and which, at our anthracite mines, is said to amount to 1½ tons for every ton of salable coal, is, in Germany, regularly sold at 25 cents a ton, loaded on cars, and is either mixed with tar and pressed into bricks, which are used as fuel for steam-boilers and house-stoves, or is blown dry, by a steam-jet, into the fire-box of boilers, as petroleum spray sometimes is with us, and with very much the same effect. These several improvements may offer valuable suggestions to our own coke-burners.

APSES.[1] — I.

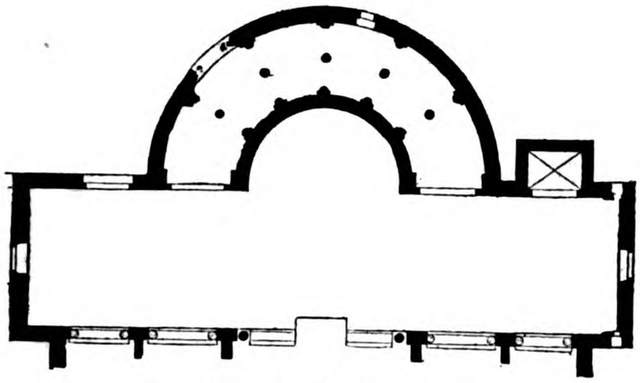


Fig. 1. Plan of St. John Lateran, Rome.

IN the earliest Christian basilicas the apse constituted the part of the *chevet* occupied by the tribune or presbyterium. It was appropriated to the use of the clergy, with the bishop's throne or cathedra in the centre; it was semicircular in plan and vaulted *en cul de four*, that is,

Fig. 2. Apse of St. John Lateran, Rome.

covered by a demi-cupola. In the first Roman basilicas, which were not religious edifices, the tribune was just at the end of the nave; but it was afterwards separated from the latter by a sort of transept, forming the choir, and intended for the lower order of the clergy and the choristers. This disposition was adopted in the fifth century. It was preserved in later structures, and notably in the basilica of S. Giovanni Laterano, which was rebuilt in the tenth century; Figures 1 and 2 give

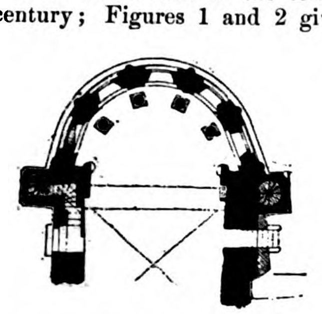


Fig. 3. Plan of the Apse of La Trinité, Caen.

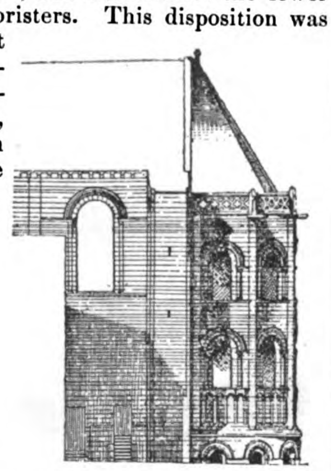


Fig. 4. Apse of La Trinité, Caen.

the plan and a perspective view of the apse taken from the central aisle. In the plan, a gallery encircling the apse will be remarked; this is not usually present, but its introduction here is accounted for by the fact that it was designed to place the basilica in communication with the court and with the Patriarchal Palace and Baptistery, both of which are in the rear of the *chevet*.

In apses of the Roman period, the circular form was quite generally maintained in France; however, in Provence, they were often built on a polygonal plan, as, for instance, in the church of Thor (Vaucluse), which has one of the most remarkable apses in the province. We must note also that at this time, independently of the principal apse, which was in the axis of the church, other apses, or apsidal chapels, were constructed along the transepts and at the extremity of the side-aisles. In certain houses of worship, notably the Cathedral of Noyon, even the transepts have circular, apse-like terminations; still, these are not of frequent occurrence, and their position is, moreover, inconsistent with a rule adopted for the orientation of the apsidal chapels, which are generally on the eastern side.

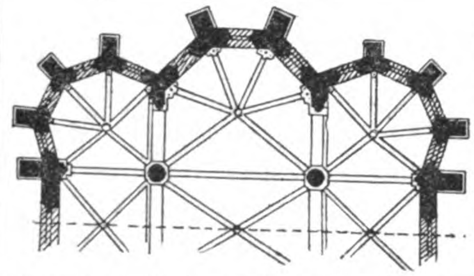


Fig. 5. Plan of the Apse of the Church of Ferrières.

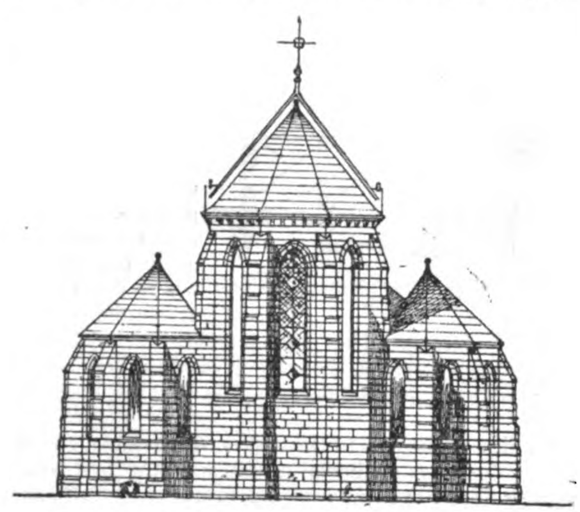


Fig. 6. Apse of the Church of Ferrières.

In the discussion of apses, we must distinguish those belonging to churches with a single nave, those in edifices with simple collaterals, and, lastly, those in important monuments, such as most of the large cathedrals, where the side-aisles run around the choir and constitute circular or polygonal galleries, termed deambulatories.

Churches of the first class are sometimes of vast size, but this simple plan is most often applied to small structures in hamlets and villages. The apses in these are merely a prolongation of the nave, of the same breadth and height, and terminating in a curved or polygonal wall; such is the apse of La Trinité at Caen (Abbaye aux Dames), a church of the twelfth century; the plan and one side are shown in Figures 3 and 4. The same general disposition is often adopted when the nave is flanked by side-aisles, only, in this case, the collaterals frequently terminate in chapels affecting divers forms, and materially modifying the aspect of the *chevet*. As an example, we give (Figs. 5, 6) the interesting and well-defined

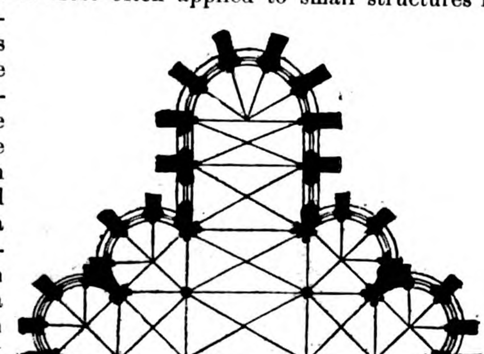


Fig. 7. Plan of the Apse of the Church of Braisne (Aisne).

[1] From the French of G. Redon, in Planat's *Encyclopédie de l'Architecture et de la Construction.*

design of this part of the thirteenth-century church of Ferrières (Seine-et-Marne); the student will notice the ingenious fashion in which the lateral chapels are planned, so as to make them wider than the corresponding side-aisles, and join them to the central apse in a way to prevent any defect in the joint that would interfere with the shedding of the rain-water; this disposition

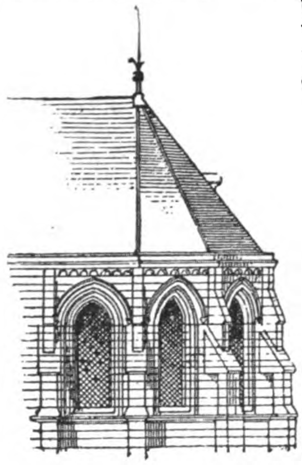


Fig. 8. Apse of the Church of Braisne (Aisne).

Fig. 10. Apse of the Church of Vernouillet.

not only adds to the interior and exterior effects, but it is so skilfully treated that it produces the happiest of impressions. The thirteenth-century apse of Braisne-le-Comte (Aisne) may also be cited as one of the finest in this same respect: the chapels attached to the side-aisles and the transept contribute greatly to the effect, which is very striking, especially in the interior; on the elevation of the central chapel, a device in the buttresses will be remarked; they are pierced, and assure means of circulation over the wall below where it is thicker than at the points where the windows are pierced. This arrangement, the object of which is to render the bays of the edifice easily accessible, is quite generally adopted, particularly in this part of France (Figs. 7, 8).

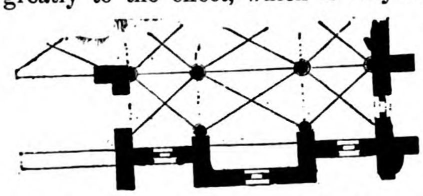


Fig. 9. Plan of the Apse of the Church of Vernouillet.

In churches analogous to those described above, and without enclosing side-aisles, mediæval architects often had recourse to rectangular apses, even in very important structures, as in the

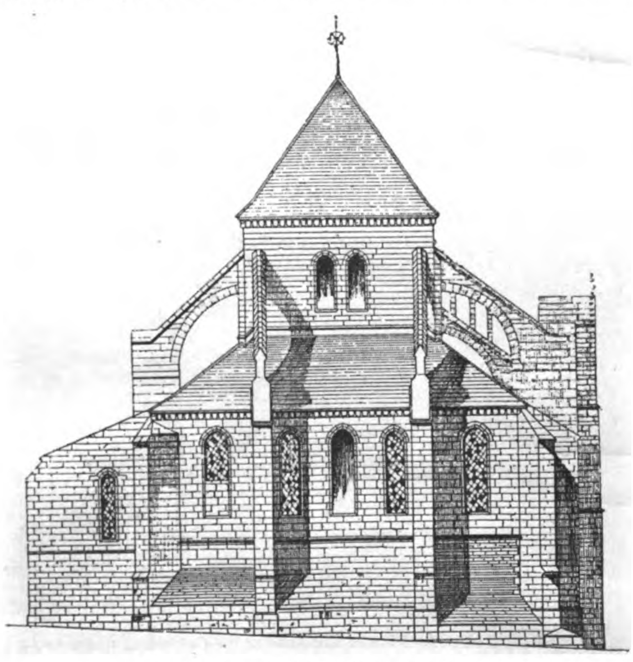


Fig. 11. Apse of St. Martin's, at Clamecy.

Cathedral of Laon; but this economical disposition was chiefly adopted in small edifices, and gave rise to solutions that are noteworthy from various standpoints. Especially striking and worthy of imitation is the effort displayed by the architects of the period so to dispose these rectangular apses as to secure by their form a suitable termination of the building, and avoid the appearance of a sudden cutting off of interior bays that might have been repeated indefinitely. Already, in the

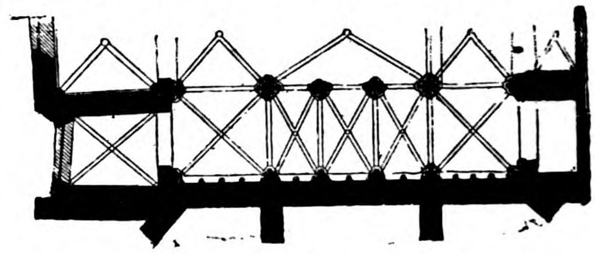


Fig. 12. Apse of St. Martin's, at Clamecy.

little church of Vernouillet (Seine-et-Oise), which dates from the latter part of the twelfth century, we see, in both the plan (Fig. 9) and the elevation (Fig. 10), this attempt asserting itself quite plainly in the establishment, between the two intermediary buttresses of the apse, of a projecting part covered by

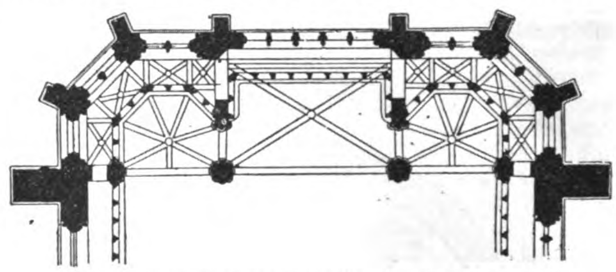


Fig. 13. Plan of the Apse of the Church of Tour (Calvados).

a special stone roof, the gable of which is sharply defined. In other edifices, like the church of Clamecy (Nièvre, see Figs. 11, 12), the square apse is surrounded by an aisle, the special object of which is to mark the limit of the construction, and the solution is clearly expressed externally as well as inter-

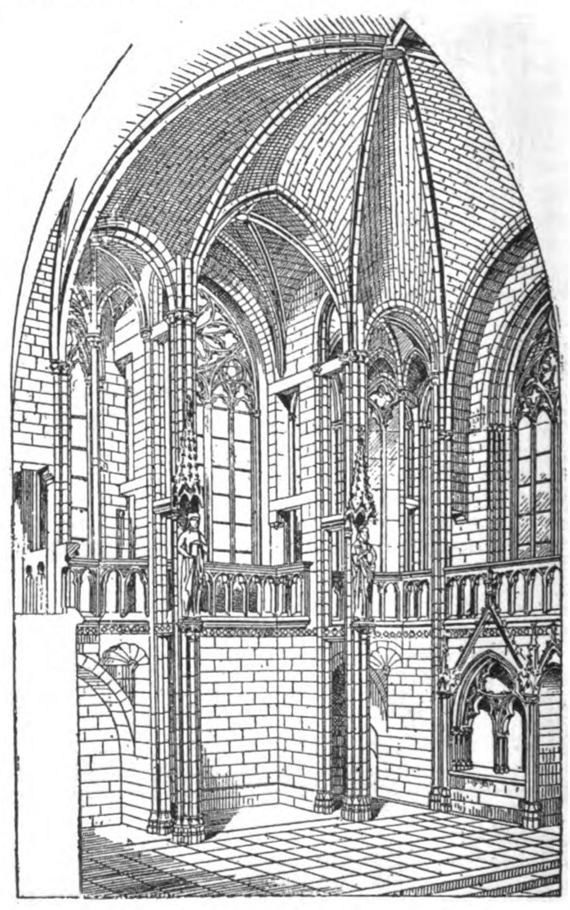


Fig. 14. Apse of the Church of Tour (Calvados).

nally. But it is, above all, to the church of Tour, near Bayeux (Calvados), the apse of which goes back to the close of the thirteenth century, that we must turn for a really original disposition and one of exceptional artistic merit. At the

extremity of the choir (See the plan, Fig. 13), which has no side-aisles, there are three chapels; the central one of these is larger than the others, and is rectangular in shape, while the others are polygonal; they communicate with one another in the lower part, owing to the disposition of slender piers adopted, and also at the level of the balustraded gallery extending the whole length of the choir and nave. The first piers span the entire height of the choir, bear the springing of the main vault, and receive, in addition, arches from each of the chapels, which are separately vaulted according to the plan indicated in the perspective view (Fig. 14). For the security of these delicate piers, it will be remarked that at certain well-chosen points stone lintels are very skilfully introduced, so as to act as stays, but, at the same time, in no way detract from the decorative and original effect of the *ensemble.* It is true that the conception may be charged with whimsicalness, the complexity of which was not logically called for; but, when we have made this concession, it must be granted that there is a great charm in the composition, which is most ingenious as regards the use of the stone and most harmonious in the combination of the details; the scale and forms of the latter contribute much to the general impression produced. Certainly, with a few simplifications, an architect may find here an excellent guide for the treatment of a similar case, when designing the rear of a large hall in a religious or even a civil construction. As to the exterior, although very simply shaped in comparison with the interior, it is not commonplace; it gives rise, by the sharp indication of the different bays and the broken rear wall, to the idea of the spirited character of this *chevet.*

(To be continued.)

LONDON

THE NEW BLACKWALL TUNNEL UNDER THE RIVER THAMES.

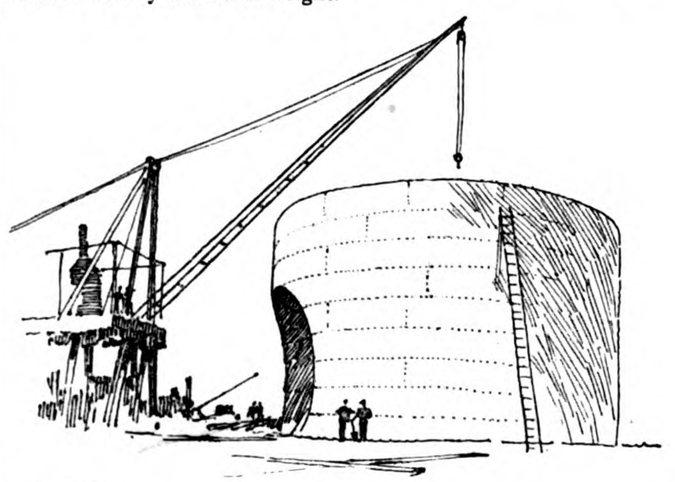
IT has often been remarked how completely the inhabitants of the eastern portion of London are cut off from one another by the absence of adequate river communication. London Bridge is, as every one knows, the bridge lowest down on the river Thames, and, until recent years, there was scarcely any method of communication between the great industrial districts of the northeast with those of the southeast. The Thames Tunnel at Wapping has, of course, been in existence for some years, but it was of no practical value for carriage traffic, and latterly has been simply a railway tunnel, and nothing more. The new Tower Bridge will relieve to a certain extent the overcrowded traffic which places London Bridge in a constant state of block, whilst the free Woolwich ferry has to a certain extent diverted some of the traffic in the extreme east. The new Blackwall Tunnel is situated about one-half mile beyond Greenwich, and will bring into direct communication Limehouse, Blackwall, Poplar and East London generally with Greenwich, Plumstead and Woolwich.

The Blackwall Tunnel has had a curious history. It was felt by the late Metropolitan Board of Works that the East End of London had been neglected, and the decision to construct the tunnel was really arrived at by the Board, not the County Council. Matters had, indeed, progressed so far that tenders were received by the Board for the work, and they actually decided to accept a tender from Messrs. Pearson & Sons within ten days of their extinction by the Local Government Act. This proposal was, however, frustrated by the Local Government Board, who advanced the date of the Board's extinction from April 1 (the date fixed by the Act) to March 21.

The County Council took up the work, but decided to put on one side most of the preparation that the Board had made, and decided to spend £10,000 in experimental work. Sir Benjamin Baker, who was then about to visit America, was consulted, and he offered to inspect the tunnels under the Hudson and St. Clair rivers. The result of this inspection was to satisfy himself that there was no doubt that it was perfectly practicable to tunnel under rivers by means of a shield and compressed air. Upon this report, the proposed experimental works were abandoned, and, after sundry alternative proposals for a ferry, etc., it was decided to proceed with the driving of a single tunnel, 23 feet internal and 27 feet external diameters. Four tenders for this were received, and Messrs. Pearson & Son were appointed contractors. The net total of the contract was £871,000, but to this should be added the additional cost of the acquisition of property and the formation of approach roads, which brings up the total cost to £1,500,000.

The actual contract work consists of three kinds. It begins on either side with an open approach leading towards the river, and descending at a gradient of 1 in 36. The roadway is lined on the sides with glazed brick. Then comes a section of "cut-and-cover" work, which is carried out by excavating from the surface, building the tunnel, and then filling-in the soil afterwards. Between the ends of these sections, on either side, comes the actual tunnel itself. From shaft No. 4, which is about one-third of a mile from the beginning of the open approach, the tunnel slopes for a length of 602 feet to shaft No. 3 on the bank of the river, where the roadway will be 78 feet below the surface and 72½ feet below high-water mark. The tunnel then proceeds on the level 1,212 feet across the river to shaft No. 2 on the edge of the Middlesex bank, and then slopes upward for a distance of 447 feet to shaft No. 1, where it again enters the "cut-and-cover." The most difficult portion of the work will be in the centre of the river, where for 150 feet there will only be seven feet between the bed of the river and the 53 feet of water overhead. From end to end, the work will be 6,200 feet, or nearly a mile and a quarter, exclusive of the new roads which are to give access to it from the districts both north and south. The tunnel itself will be of iron tubing, filled with two feet of concrete. The carriage-way will be six inches above the bottom of the tunnel and seventeen feet below the top of the arch above. It will be 16 feet wide, and will have foot-paths three feet wide on either side. Below will be an arched subway to carry water-mains, etc.

At present a considerable portion of the "cut-and-cover" work is in hand, and the four great caissons are nearing completion, one of them having already been sunk in position. The caissons are about sixty feet in diameter, and are used for ventilation and access by staircases after the tunnel is made, and to act as fixed starting-points while the tunnel is in progress. They are made of riveted iron plates five feet apart. They are open at the bottom and below the openings constructed for the tunnel to pass through they are of wrought-steel, to give rigidity and firmness as they descend into the earth, the bottom ring being a sharp-cutting edge of steel. They are built up in rings, and the earth inside gradually removed, so the caissons sink by their own weight.



Shaft No. 4 is being used as the shaft from which the shield is being worked, and, with compressed-air engines, windlasses, lifts, cranes and railways, presents a most busy appearance. The shield is not precisely the same as that used at the Hudson River by Messrs. Pearson, but it is a modification of it. I have been down this shaft, and have followed very carefully the construction of the tunnel; but such a really capital description has been given by a visitor and published in *London*, that I cannot do better than give it to you:

"Donning a suit of waterproof overalls," he writes, "I was conducted to the mouth of No. 4 shaft, from the bottom of which a confused din of strange sounds came rolling up. Across the top of the yawning iron-lined pit was rigged a substantial stage, forming the terminus of a railway, upon which small locomotives were busily drawing away train-loads of clay to the tunnel below, to be used in raising the level of approach roads half a mile away. Truck-load after truck-load came up from the dim depths in a cage, and was mechanically tilted onto wagons waiting to receive it, the empty trucks then going down to be run along the rails at the bottom of the tunnel to the place where the shield was at work. When the tunnel is somewhat longer, an electric engine will be taken down to draw the trucks along from the shield to the foot of the shaft. Descending carefully the wooden stairway leading to the foot of the shaft by long flights of about thirty steps each, mostly covered with slippery, wet clay, I arrived safely at the bottom and entered the tunnel. It is formed of iron rings two feet six inches wide, and each built of fourteen curved segments a little over six feet long. Every segment weighs a ton, being two inches thick, and having flanges along its edge by which it is bolted into place, and which then form strong iron ribs on the inside of the tunnel. Picking my way artfully along the side of the railway, I came to the shield, and gradually, in the light of the electric-lamps, formed some idea of its working.

"To understand the Greathead shield, about which so much that is unintelligible has appeared in the press, it is necessary to remember the purpose for which it has been invented. The shield does not itself dig or remove the rock and clay; neither does it force itself through like a snow-plough. It is simply a contrivance for stemming back the deluge of water which would rush in upon unprotected workers engaged upon loose strata with a river 70 feet deep overhead, and so preventing the whole operation from being swamped in water and mud. This is done by working in compressed air at a pressure of between two and three times that of the air outside. The shield is, in shape, like a huge iron drum, weighing 250 tons, and divided, honeycomb fashion, into twelve cells, each leading through from the face of the clay to the interior of the tunnel. Each cell is opened toward the clay to be removed, and affords space for a couple of men with picks and shovels to break away the dirt and shovel it back into the shield. Behind the heads of these men is an iron partition descending about a foot from the top of the cell, and farther back still another coming down about half its total height. Farther back still are two strong, air-tight walls, through which doors for the men and shoots for the dirt lead out into the tunnel. The whole of the air in the shield is kept at a pressure of about thirty pounds to the square inch at times when the work is in danger of flooding. The air-pressure is sufficient to drive back the water that might otherwise rush through. Even when the river may be only a few feet overhead, it is thus rendered unlikely that any mishap will occur, as the only part of the soil unsupported is the few inches in front of the shield, and even this is held up by compressed air. But, in case of mishap, every possible provision is made for the safety of the men. The two partitions coming partly down the cell behind them form complete diving-bells. At the first sign of danger they can step back into the first, and, if the water should enter, it cannot possibly rise higher than their shoulders. Should it come in at all, they would instantly stoop under the next partition into the second diving-bell, where the water could not come above their waists. All they would then have to do would be to pass through the doors in the two air-tight walls, closing each after them, and they would be safe in the tunnel, the water being safely dammed back by the 'shield' till the mischief could be repaired.

"When two feet six inches of earth have been dug away from the face of the shield, it has to be forced forward into the vacant space. Round its outer edge, on the face toward the rock, is a hard-steel 'cutting-edge,' like a gigantic cheese-cutter, 28 feet across. The men in the outer cells have cut a ring-like depression, into which this cutting-edge will fit. At the back, the shield projects like the sliding-shade over the object-glass of a telescope, completely encircling the last-made rings of the tunnel. It has to be pushed off these rings far enough to allow another to be built inside it, the cutting-edge in front moving into the space prepared for it. But, with a weight of 250 tons, and the outer soil resting on its top and the end of the tunnel on its bottom, the shield, naturally, does not move without pressure. This is supplied by twenty-eight hydraulic 'jacks' placed around it at the back, and pressing against the ring of the tunnel-tube which has just been built. By turning 14 taps or valves all at one point, a single person can put a pressure of 3,000 tons on the shield, and the monster is made to slide forward just far enough to make room for another ring. Its course has to be guided to a hair's breadth, and this is managed partly by digging more soil away, and so 'easing' the shield on one side if it has displayed a tendency to go wrong at the previous shift. But its direction is also regulated by the amount of pressure put on the various jacks, and it may be imagined that this is a peculiarly delicate task, though the mere handling of the taps is child's play, and all the power is supplied by the engines far above on the surface.

"The dirt coming through the shoots in the shield does not all descend to the floor of the tunnel, stages being erected at different levels, upon which trucks are loaded, then lowered in a cage to the floor and run along the rails to the bottom of the shaft.

"The building of the ring after the shield has moved would be a very difficult thing if done by hand, the hoisting of a curved plate weighing a ton to the tunnel roof, and there bolting it, being no small work. But there are two huge hydraulic elevators, or 'machine arms and hands,' as they might be called, which pick up a plate and swing it into position, holding it there until fixed. The whole operation of putting in a new ring, including the digging away of dirt, can be got through twice daily, so that full working speed means five feet of tunnel a day. A good deal of water comes through during the building of a ring, a space of about one inch being open between the inner side of the shield and the rings already made. To prevent this water from interfering with the work at the lower part, an ingenious invention of Mr. Greathead, the designer of the shield, is applied. A two-inch pipe is laid down with its mouth just where the water would collect. Inside the pipe, and directed away from its mouth, is a tiny nozzle, which delivers a pin-head stream of water at about a thousand pounds of pressure. This immediately produces a complete vacuum behind, and the pipe sucks in the water at a rate which would need pumping machinery enough to half-fill the tunnel. Before the water can settle, it is sucked-in by this handy little apparatus and shot up to the surface, so that the place is kept comparatively dry.

"I was much interested in the strata presenting themselves to the face of the shield, as with some difficulty I clambered into one or two of the cells in which work was proceeding. All the upper part of the shield faced dark-colored, stiff clay, but to the right and low down a sloping sand-bank lay underneath. There was no confusion or mixing; as the earth broke away beneath the pick, the line between the two materials was as sharply drawn as if done with a pencil. On the surface of the sand lay an inch or so of white shells, very crumbly and fragmentary, and breaking to pieces the moment they were taken in the fingers. Here and there were patches of dark, organic vegetable matter, shiny, but not hard like coal—probably decayed seaweeds. Below lay the soft, clean sand, and above the dark, clammy clay, millions of tons of which had been deposited on the shells without so much as crushing what I could not touch with my finger without producing a breakage.

"After an hour or two in these underground studies, I returned to the surface and saw the various engines by which the power required below was produced. Four boilers 30 feet long and 7 feet 6 inches in diameter supply the steam. In the engine-room alone over £10,000 worth of plant is laid down, the largest engine being that for compressing the air to be used in the tunnel. This has a fly-wheel about eighteen feet in diameter. Great pumps are employed in raising the water in different parts of the ground, and the level of the underground water of the neighborhood has gone down thirty or forty feet [*sic.*] owing to their labors.

"When the iron tunnel is completed for a certain distance, the inside will be covered with concrete to a depth of fourteen inches, and inside this enamelled bricks will be built, giving a fine internal finish. In the 'cut-and-cover' portion, some of which is nearly completed, a layer of asphalt is placed outside the concrete, so as to make the whole absolutely water-tight without the aid of the riveted iron tunnel."

AUSTRALIA

A STRIKE OF THE USUAL KIND.—THE ARCHITECT, ENGINEER AND CONTRACTOR.—AUSTRALIAN HARDWOODS FOR STREET PAVING.

SYDNEY, N. S. W., August 6, 1893.

THE innate stupidity of tradesmen taken collectively, has often been insisted upon; but no more forcible exemplification of the truth of the statement could well be imagined than that which is to be found in the strike of masons in Sydney, last week. The Mutual Life-Insurance Company of New York, is about to erect a large office-building at the corner of Martin Place and Pitt Street, and building operations were barely under way before a strike was threatened unless the heretofore prevailing rate of wages was maintained. A few weeks elapsed, and now the masons on this particular work have been ordered out, and the job declared "black" because, forsooth, the union directly concerned has discovered that though some of the men employed have been receiving the standard wage—eleven shillings—others were only being paid at the rate of ten shillings per day. The contractors, naturally, argued that it was unreasonable to expect them to pay all alike; that those who proved themselves to be worth eleven shillings received that amount, while others less skilled, were paid the smaller sum. As might have been expected, this apparently logical arrangement did not suit the unionist leaders, and as their demands were not complied with, they compelled the men to leave the work. Such a proceeding would seem despotic and stupid enough at any time, but at this period of unprecedented depression, it is absolutely idiotic. There are very few buildings in course of erection, and many masons and bricklayers are glad to earn five shillings a day by working as laborers; the "unemployed" difficulty is assuming such vast proportions that the Government has inaugurated a system of coöperative-labor settlements in the country districts, and on every hand there are organizations for the relief of the destitute during the winter months. And yet, in the face of all this, and while Australia is striving to shake off the effects of a great financial crisis, the unionists ordain a strike! These trades-unions have within the last few years received several severe lessons; but they have, apparently, yet to be taught that a strike to be effective must be successful.

An excellent paper was recently read before the Institute of Architects of New South Wales by Mr. George Allen Mansfield, F. R. I. B. A., on the relative position of the architect, the engineer and the contractor, in which the author replied to some of the statements of a well-known engineer, Mr. Norman Selfe, who had previously read a paper on practically the same subject at a meeting of the Institute of Civil Engineers. Both papers were well written, and the points forcibly put; and though, from an architect's point of view, Mr. Mansfield had the best of the argument, there would seem to be much to say on both sides. As was remarked when the paper was being discussed, the extensive use of iron and steel in modern buildings has upset our preconceived old-fashioned notions as to

where the duties of an architect should end and those of the engineer begin; and it would be to the common benefit of the practitioners of both arts if some amicable arrangement could be arrived at to prevent the clashing of their respective interests.

New market-buildings are about to be erected on the site of the old structure, and the Sydney Municipal Council have approved of the City Architect's design for this important work. The drawings have not yet been published, but the design is said to be an extremely fine one, of an American-Romanesque type.

Direct communication with Canada by the Vancouver route seems to be destined to open up a great trade between the Australian colonies and the Dominion; and if a little reciprocity could be brought about between Australia and the United States it would probably be to the advantage of both. At present enormous quantities of American pine are imported by us, for though Australia is exceedingly rich in hardwoods, the colonial pine is not of first-rate quality. With regard to the hardwoods, however, they are better and of more numerous variety than those of any other country. A splendid collection of these timbers was forwarded to the Chicago Exhibition where they should attract more than passing attention.

An Australian in America has lately suggested in the columns of the daily press, that a trial shipment of hardwood blocks should be forwarded to San Francisco, for if the people of the Californian State could be once persuaded to experiment with them for street-paving purposes he is certain that they would be adopted in a very large degree by the authorities of all the principal cities in the United States. When well laid they make a clean, smooth and not expensive roadway, which will last a life-time, and cost very little for repairs. The only drawback is that when slightly wet they are rather greasy and therefore somewhat treacherous for horses, but this defect is obviated here by sprinkling sand over them. It is owing to the use of these blocks that Sydney promises shortly to have the best laid streets of any city in the world.

THE ARCHITECT, THE ENGINEER, AND THE CONTRACTOR.

THE following is a paper read by Mr. G. Allen Mansfield at a meeting of the Institute of Architects of New South Wales, held during the last week of July:

There can be no doubt that in some important particulars the duties which devolve upon the architect of the present day, and the demands upon his knowledge and skill, differ from those pertaining to the architect of a generation ago. New developments have taken place in the requirements of everyday life, and new conditions have arisen which increase the scope of his field of labor. It is in the treatment of structures for business purposes that we must look for the most striking changes which have taken place within a comparatively recent period. In planning a dwelling-house, whether it is to be the lowly cot, the middle-class villa, or the lordly castle, we have to provide for the same needs of comfort, convenience, and fitness as did our predecessors of a century ago. In the details of its construction and finish there may and do enter in many modern improvements, but these are rather in the nature of appliances than integral parts of the structure which forms the home.

It is when we leave the region of domestic architecture and enter upon the field presented by the requirements of the modern warehouse, the hospital, the hotel, or the factory, that we are brought face to face with the fact that we have to deal with much that is not entirely to be expressed by the term "architecture," that we are called upon to provide for many and various mechanical appliances, and that even into the construction of the building proper there enters an application of materials which renders imperative an extension of our knowledge, and of our ability to deal with them. Of chief importance amongst these is the extensive introduction of iron and steel into most of the large buildings used for business purposes, while the requirements for lighting, heating and hoisting of goods have made indispensable the introduction of mechanism and often of motive power.

The use of iron and steel for constructive purposes, and the use of mechanism for the daily business functions of the building, are, however, not to be confounded. They form two distinct and separate items in the designing and carrying to completion of a structure such as we have under consideration. It would seem from recent discussions on the subject which forms the title of this paper that in some way — unaccountable to my mind — there has arisen a tendency to confuse the two things, a tendency to assume that the mere presence of iron or steel in a building necessarily implies the presence of an engineer; that iron and steel are materials of which engineers have of right the whole and sole monopoly; and that for an architect to encroach upon that domain is something approaching to piracy, if not to sacrilege. He must promptly be warned off that holy ground.

It is true a bard has written:

> "Ah! me, what perils do environ
> The man that meddles with cold iron."

But I do not think the context conveys the idea that the poet had in view an architect laying profane hands upon that which was consecrated to the tutelar deity of the engineer. No; if in the development of modern buildings there has come about a need for the use of these materials, the lesson to be learned is that so much the more must the architect give study to the nature of these materials and to the best methods of utilizing them. If it is necessary that he should be acquainted with the properties and uses of brick, of stone, of timber, and the thousand and one other productions of nature and art which enter into the composition of his building, equally necessary is it that his studies should be applied to iron and steel. Why, I would ask, should these two articles be singled out from all the rest as unsuited for him to deal with? Why in this instance alone should he be expected to call in the aid of some other expert to assist him in an important part of the designing and execution of his work? Why not have an adviser about brick, an adviser about stone, and so on *ad infinitum*?

Be it far from us to impose upon ourselves any such system of leading-strings. It is in my opinion of the last importance that the architect should retain the full mastery and control of his own designings. And after all, the demand made upon our acquirements for the proper mastery of this subject is not a very severe one. The problems of strengths and strains which enter into the study of the ironwork of even the largest buildings are not of a very abstruse character. The most ordinary amount of care and a moderate acquaintance with the accepted formulas of iron and steel calculations should suffice to render the chance of serious error almost infinitesimal, the more so as the necessity for extreme economy of material has practically no existence in our works. In the construction of a "Forth Bridge" it is easy to see that economy of material demands the most careful study — the enormous quantity used, and the fact that the weight of the very structure itself forms the greatest part of the strain to be provided for, render imperative the most rigid scrutiny of the scantling of every part. In ordinary building works these conditions do not prevail. The amount of material used is comparatively small, and a little excess of strength is of no great consequence. Indeed in building there is often a good deal of nonsense talked about "economy of material." The cost of the rough materials of a building bears so small a proportion to the cost of the labor bestowed upon them, that a little more or less affects in a very small degree the ultimate cost of the whole.

Indeed the general fault is that too little material is put into the work rather than too much. Flimsy structures — skimped and starved in material — are to be found in every suburb by the thousand; but where are we to look for instances of the too lavish use of that which gives substance, solidity, and durability to a building? And if in the arrangement of the ironwork of a building — if in its contrivance for use and ornament, and the calculations for its strength — the architect finds no great difficulty, neither should he in the supervision of its execution. A reasonable amount of observation and care should bring the young architect to such a knowledge of how ironwork ought to be done as to enable him to efficiently supervise the execution by the contractor of the work intrusted to him. The eyes to see, the hands to handle, and the intelligence to discriminate which serve him in his judgment upon a brick arch, a concrete foundation, or a framed timber roof, will suffice to direct him in his criticism upon the workmanship of an iron girder, or the soundness of an iron casting. In either case a certain amount of experience is presupposed, and that experience it must be his business to acquire. And here I would say a word of warning against an overstrained reliance upon formula and calculations. That these are often desirable, and sometimes indispensable, goes without saying, but the man who finds himself obliged slavishly to rely on them is not a born constructor. As there is a gift in art — as a poet is not made but born, so it is in construction. Not all the mathematics in the world will supply the place of that intuitive recognition of forces which is the gift of the born engineer. Neither will they confer the wisdom which is the outcome of experience and of long familiarity with the handling of materials. Indeed, in many cases — and more particularly in works on a small scale, calculations may be worse than useless — they may be positively misleading. In estimating the stability of a small pier or the equilibrium of a small arch, he is but a poor creature as a constructor who would not rely on the judgment of his own eye and his own innate consciousness of what is safe or unsafe rather than on all the mathematical calculations that could be crammed into a ream of foolscap.

This, however, by way of parenthesis. I take it, then, that I have indicated a clear and well-defined limit within which the special function and prerogative of the architect is not to be encroached upon, viz, the designing of the building proper in all its parts — its stone, its brick, marble, concrete, timber, iron, steel, tiles, slate, plaster, glass, are all the units of the mass — to be arranged and disposed of, and wrought into a harmonious whole by the influence of one mind and under one inspiration. I have drawn, as I think, with sufficient clearness, the line which, in every aspect of professional practice and of common-sense, must of necessity mark the boundary which divides the province of the architect from the province of the engineer. To repeat, it is summed up in the words "the design and construction of the building proper." We have now to consider the mechanical appliances which are required to fit the building for the business operations which are to be carried on therein. And here we call in and gladly welcome the coöperation of our twin brother the engineer. In the case of a large hotel we shall need passenger-elevators — baggage-lifts — driven by steam, by gas-engine, or by hydraulic power. We shall need electric-light, and possibly the motive power to produce it. Steam will be required for

cooking and for hot-water supply. Cold-storage must be provided. If it is a warehouse we are concerned with goods, and passenger-elevators will be required, and probably hydraulic-presses for packing. In the factory steam-power will almost certainly be a necessity, and soon throughout the whole range of business establishments, not even excepting those temples of Mammon known to the moderns as "banks."

To ensure the proper arrangement and successful working of all these mechanical appliances it is advisable at a very early stage of the proceedings to consult a skilled engineer. The architect should have such a general knowledge of what is likely to be wanted for these purposes as will enable him at the very earliest inception of his design to include the requisite provision of space in the general scheme of his plan.

But the sooner his general knowledge is supplemented by the more exact knowledge and experience of a properly-qualified engineer the better, the more likely he will be to save himself an infinity of worry and anxiety in the future, the more certain he will be to give satisfaction to his employers, and the fairer chance will he give to his coadjutor to do himself justice and to lay out his plans so as to ensure success. It has been said, and, I think, with some truth, that too often the engineer is not called in until the building is well forward towards completion, and that it is often found necessary to pull down a wall here and punch an opening somewhere else, and generally to pull the work about in that fashion which is so exasperating to any builder of a well-regulated mind, and after all, probably, the unfortunate engineer is cribbed, cabined and confined as to his machinery, and forced to adopt expedients which are not approved by his better judgment, but which are thrust upon him by the exigency of circumstances — circumstances which he has no right to be placed in did his brother Chip, the architect, but give him fair play from the start. It is, indeed, of the greatest importance that the engineer should have opportunity of conferring with the architect at the very outset as to the provisions necessary to meet his requirements. Having made these known as to floor-area, chimney-flues, well-sinking, etc., the architect can make all necessary preparations, and, having done this, his dealings with the machinery and his responsibility connected with it are at an end. From this point he should resign the full control thereof to the engineer, reserving to himself only the right to put a veto upon any little eccentricities which may develop themselves to the detriment of appearances or stability in his building. Working on these lines, the architect carefully maintaining a full charge and responsibility for his own proper work, and taking early into his confidence the engineer, and providing properly and sufficiently for his wants — the engineer placed in a fair position to devise and carry out his arrangements to the best advantage — working it, say, on lines such as these, the twain may well walk amicably hand-in-hand, and coöperate in the most friendly and harmonious spirit to produce the happiest results.

It will be noted that, in considering the relations between architects and engineers, I have confined my remarks entirely to the case of an ordinary building — a building intrusted in the first instance to an architect, and in which he requires the assistance of an engineer. I have restricted my attention to this because it seems to be the phase of the question that most immediately concerns us. It is the occasion on which we are most frequently brought into contact, and, therefore, the most practicable and serviceable subject for inquiry at the present moment.

I do not forget the many cases in which our works approach each other so closely as to be not easily distinguishable, as the designing of railway-stations and engine-houses, the decorative treatment of canal-works, bridges and the like; but these of themselves form so extensive a field of discussion that I have thought it more profitable to limit my remarks to the special subject with which I undertook to deal. Before quitting altogether the subject of coöperation between architects and engineers, it may not be out of place to refer briefly to the new development of building-construction which is now going on in America, where iron and steel are made to form so large a proportion of the structure that all the rest sinks into comparative insignificance.

I admit that I have yet much to learn about the details of this new system which seems to treat the building as composed chiefly of an elaborate structure of iron framing and columns, with concrete floors, and to regard the walls as a mere skin to enclose them, but I cannot bring myself to feel that this is the spirit in which the creation of any great building should be approached. From an architectural point-of-view, it is impossible to believe that any realization of beauty, grace or grandeur can result from such a cold-blooded treatment of materials. It is certainly devoid of all poetry and of all sentiment, and to rob architecture of the poetry and the sentiment which lend a charm to so many of the triumphs is to dethrone her from her high estate, to disestablish her as an art, and to relegate her to the rank and file of the mechanical crafts.

The genius which found expression in a Corinthian order — in a Temple of Luxor, in an Alhambra, in a St. Mark's Library at Venice, a Westminster Abbey, a St. Peter's at Rome, or in any of the great examples which form the glory of our art in all its varied forms and adorn its history, is not the genius which can be evolved out of these hideous combinations of materials — these two painfully utilitarian productions of a prosaic age. They are, as I think, the outcome of a too great theoretical striving after a fireproof construction — a too complete engrafting of the work of the engineer upon the work of the architect, and as such they may serve as warnings of the danger of such a tendency — the danger that is incurred in allowing that which is supposed to be eminently practical to overshadow all that is artistic and beautiful.

We pass now to a review of the relations between the architect and the building-contractor. Here, fortunately, no difficulty presents itself, and no complications are encountered. Their separate functions are so clearly defined that it is necessary only to adhere to the most ordinary rules of everyday practice to avoid all chances of misunderstanding.

The builder is the executive charged with the duty of erecting the structure planned and contrived by the brain of the architect, and, though he acts under the general guidance and control of the architect, the ultimate success of the work depends in no small degree upon the amount of zeal, fidelity and intelligence which he brings to bear upon it. That these conditions are by no means rare amongst us is abundantly evidenced by the excellence of the workmanship and materials to be found in so many of the more important buildings in the City of Sydney and suburbs. Careful and conscientious architects make honest and trustworthy builders. I can imagine nothing more demoralizing to the building trade than for an architect to tolerate work of a character inferior to that required by his specification.

A— tenders for certain work, with an honest intention to use only materials and labor of the best, and regulates his price accordingly. B— obtains the contract at a price perhaps considerably lower, uses cheap materials and inferior workmanship, and pockets a good profit out of it. What is the lesson taught to A—? Certainly not a salutary one. Hence it follows that the more firm an architect is in requiring a faithful execution of work by the contractor, the more does he further the interests not of his client only, but of all upright and conscientious builders. It is of importance, too, that the builder should be furnished in good time with all the information necessary to enable him to proceed expeditiously and systematically with his work. Delay in the preparation of detailed drawings and in the decisions to be given by the architect upon the numerous questions that crop up from time to time means vexation to the contractor, and often a serious curtailment of his legitimate profits. Much friction and unpleasantness between architect and builder may be obviated by a timely settlement of all questions of extra cost or value of deductions as they occur during the progress of the contract. I do not for one moment suggest the abolition or the weakening in any degree of what I look upon as one of the most important prerogatives of the architect, viz, the power conferred upon him by the agreement and conditions of contract to appraise the value of extras and deductions. This I would jealously maintain as an absolute necessity of our practice. Subject as it is to the reference to arbitration, it is not a privilege likely to be abused, and, when judiciously and fairly exercised, it constitutes a healthy safeguard of the interests of our clients. Still, in the more important variations which are liable to take place in even the most carefully thought-out scheme, it is better to get the question of quantities and values settled at the time, and I have found the plan to work very smoothly.

A few words in conclusion as to the attitude of the public towards the profession. I regret that I cannot regard this as altogether satisfactory. Critics we have in abundance and to spare, but of those who can appreciate good work and value it at its true worth the number, I fear, is very limited. This arises in no small degree from the absence of a satisfactory education by the press. It is, perhaps, too much to expect that a highly-cultured criticism of our works should be provided by the daily newspaper; the high pressure under which it is produced may not admit of this, but it cannot be said that the ordinary reporter's descriptions which appear from time to time do much to educate the popular mind. But a cause more potent than this lies at the root of the evil. It is the preponderance of the commercial spirit over the artistic. Possibly this is natural in a young country where art has not yet had time to take a strong hold on the people — where competition is keen, and where the man is most highly esteemed who can get the most for his money. This it is which often exercises an undue influence on the architect, who would fain do good work, but who is too tightly restricted in the purse to give him the opportunity he longs for. This it is that induces men to give their work directly to a builder, without employing an architect at all, hoping and believing that they thereby save his commission. This it is that leads men to make hard bargains with their architects, and to fall a prey to the two-and-one-half-per-cent practitioner, under the mistaken idea that they are doing a smart thing. I do not say that this is the rule. There are many, and I acknowledge it with satisfaction, who extend a generous support to our profession, many whom it is a pleasure to serve with all one's heart; but the fact remains that there are enough of the baser sort to exercise a very pernicious influence on the rising generation of architects.

Some there are who dispense with the services of an architect from that stupid, and, I trust, wellnigh exploded, idea that they do better by placing themselves in the hands of what they are pleased to call "the practical man," meaning thereby the mechanic; as if, of all men on the face of the earth, the architect or engineer who is worth his salt was not out and out the most "practical man"; as if his whole life was not spent in the practical work of reducing the creations of his brain into concrete form and substance.

I yield to none in a hearty liking and respect for the honest and capable tradesman — for the mechanic who takes a pride and a pleasure in his work. He plays his part, and that right well, in every building that passes through our hands, and I cheerfully accord him the fullest meed of praise for the intelligent and faithful discharge of his duties; but I also know with a certainty that admits of no doubt how absolutely necessary it is that he should have the guidance and correction of a properly-trained architect.

For some cause difficult to explain, it does seem to me that an architect here does not derive the fame or reputation from his works that attach to them in the older countries of the world. It would be interesting to know how this arises, but that it is the case can, I think, hardly be disputed. I should be glad to be convinced to the contrary. Posibly the fault rests in some measure with ourselves. Whether this be so or not, let us do what in us lies to amend the evil. Let us gird up our loins and strive for still better and nobler results from our labors; strive to put such heart and such power into our work as will compel the respect of our fellowmen, and place our beloved art on the same proud pedestal in this Australian world as she occupies in the European world.

DISCUSSION.

AN adjourned meeting of the Institute of Architects of New South Wales was held at their chambers, O'Connell Street, August 4. The purpose of the meeting was to open a discussion on Mr. Mansfield's paper on "The Architect, Engineer and Builder."

Mr. Norman Selfe read the following paper in reply to Mr. Mansfield: As the Council of the Engineering Association of New South Wales invited the leading architects of Sydney to take part in discussing a paper on the relative position of the architect, the engineer and the builder in modern works, read by me at their June meeting, Mr. Mansfield's paper on precisely the same subject has presumably been written to present the matter from the architect's point of view. My thanks are therefore due to the Council of the Institute of Architects for their courteous invitation to take part in this discussion. In the first place, it is only just to Mr. Mansfield to compliment him on the general tone and high literary character of his paper. Much of it no doubt is so true as to be beyond controversy, but many things which might almost be looked upon as platitudes are clothed in such elegant and forcible language as to come upon us with the effect of new truths. Now that the public has had an opportunity of reading them in the columns of the daily press it is to be hoped that they will be pondered over by a large section of the intelligent community. Mr. Mansfield's paper deals rather more in generalities than is usual in papers read by members of learned bodies, and it certainly seems a pity that he entirely omitted to refer to any of those real vital points affecting the relation of the architect and engineer in the construction of buildings which were raised at the Engineering meetings, where they were clearly and specifically put forth for discussion. Mr. Mansfield has, moreover, with much that is good, committed himself to some sentiments and statements which will hardly be reciprocated by engineers, and it will be as well to quote them clearly before attempting to show how and why they are open to question. Mr. Mansfield says: "From recent discussions on the subject forming the title of the paper" (referring presumably to the Engineering Association) "there has arisen a tendency to assume that the mere presence of iron or steel in a building necessarily implies the presence of an engineer"; "that iron and steel are materials of which engineers have of right the sole monopoly"; and further on he asks: "Why should iron and steel be singled out and be treated differently to brick, stone and timber?" The reply to this is that Mr. Mansfield has quite misunderstood the discussion at the Engineering Association, for having taken copious notes of what was said for the purpose of reply enables me to state positively that not one speaker there intimated that he considered architects should not use iron or steel in a building at all without the advice of an engineer. Of course hundreds or even thousands of tons of metal might be built in as plates, bonds, ties, or in many other ways to a structure without coming under the head of engineering, just as thousands of cubic feet of marble could be used in a building without coming under the head of sculpture. What really was assumed was this: First, the presence of complicated engineering structures of iron or steel in a building should imply the presence of an engineer somewhere in connection with it; and secondly, demands it, if there is not to be a great waste of the client's money. If a building is to be adorned with sculpture, no architect dreams of sending to the marble mason or statuary for a group to fill a given space so many feet long, wide and high; but the sculptor prepares the model before the statuary sets to work upon the block, if a work of art is wanted. In like manner, if a scientifically-constructed piece of girder work is wanted (and properly designed girders are scientifically constructed) then accurate detail drawings showing the position of every "butt" and "rivet" should be prepared, and nothing should be left to the workman to design. It is not the question (as seems to be argued) whether an architect could learn to design girders, because it is certain he could do so if it was worth his while. The fact brought to the every-day notice of engineers is that he does not do so, and the dreadful character of some of the girders used in Sydney buildings has been clearly shown by recent speakers. The reason for this is not far to seek. When a young man aspiring to be an architect has served a term of years to a builder in order to learn the practical part of his business, and then has served his articles in a regular architect's office, and then, after having been entrusted with responsibilities, both as draughtsman and clerk-of-works, he has travelled on a sketching tour to further qualify himself to commence practice on his own account — he has already sacrificed sufficient of the best years of his life, and has got enough irons in the fire, without going-in for a course of applied mechanics, construction in iron, and workshop practice, to enable him to grasp questions which may only present themselves to him at long intervals. When he sees that he has brother professionals around him who are specialists in such matters, he will probably realize that such a game is not worth the candle. Mr. Mansfield says further: "In building there is often a good deal of nonsense talked about economy of material . . . . a little more or less affects in a very small degree the ultimate cost." And again he asks: "Why should iron and steel be treated differently to brick, stone and timber?" He also warns us against "relying too much on formulas and calculations," thinks a constructor a poor creature who could not estimate the stability of a pier or the equilibrium of an arch, by the judgment of his eye and his innate consciousness of what is safe, "better than by mathematical calculation." Now nothing in Mr. Mansfield's whole paper is more interesting, as showing the mighty, great gulf which exists between the engineer and the architect, than the foregoing extracts. With regard to his idea of throwing iron or steel into a building, and treating it in the same way as brick or stone, it seems to have been quite forgotten that while a few cubic yards of brickwork more than is necessary is neither here nor there, as it will only cost from 30*s.* to 40*s.* a yard, the price of the best girder-work may be put down at ten thousand per cent higher, because a cubic yard of finished girder-work often costs £150. It has been already shown that there are cases in Sydney where clients have had to pay thousands of pounds for totally unnecessary cubic yards of iron or steel in their girders, and no doubt this fact of the utter dissimilarity to brick and stone being lost sight of by architects has had much to do with it. Had calculations been adopted instead of "trusting to the eye" and "treating all materials alike," no doubt the money would have been saved. As for "ignoring formulas," no man should use a formula he does not understand, and then he will only use it like any other tool — to expedite his work. There certainly are cases where arches and piers are used for which there is no formula, and in which the architect must rely on his "innate consciousness," such as in the arches of double curvature which are so common at street corners on the rounded angles of buildings. These constructions, of course, are not arches at all, except in name, and it is doubtful if one of them was ever built by an engineer; but the experience of the architect in the cohesion of his mortar, and his trust in his materials, enables him to erect such works with confidence, and often to adorn them with a curved pediment or other enrichment more or less elaborate. With regard to the employment of machinery in a building, Mr. Mansfield advocates the calling in of a "properly-qualified engineer at an early period," but he does not make it at all clear whether he advocates the practice which now prevails to some extent in Sydney of an architect placing himself or his client in the hands of the contractor who is to supply the machinery, and of adopting such contractor's views, instead of himself or a competent engineer supplying plans for the sontractors to tender on. There seems to be no difference whatever in principle between the former course and the practice which Mr. Mansfield so deplores when he says, "some there are who dispense with the services of an architect from the stupid, and, I trust, wellnigh exploded idea that they do better by placing themselves in the hands of what they are pleased to call the practical man." "As if, of all men on the face of the earth, the architect or engineer who is worth his salt was not out and out the practical man." Just so: and if people are stupid for going to a building contractor without the intervention of an architect, are they wise for going to a machinery contractor without the advice of an expert engineer? It would be most interesting if Mr. Mansfield in his reply could speak out clearly as to whether he justifies the latter practice while he deplores the former, and if so on what grounds, because it appears to me (without going at all into the question that in such cases the plans which are paid for are not prepared, and other grave objections to the practice) that if architects are justified in undertaking works of mechanical engineering for their clients, then engineers who have made such work their special study for years will be justified in entering into competition as architects for the whole building. It would grieve me much to see such a competition arise, and it is to be hoped that the dignity of the two sister professions may be upheld by the members of each walking in their own special paths, and that a good understanding between the leading practitioners on each side, such as now exists may be maintained. In such a case we should find that "professional men's services would not be so frequently dispensed with" as they are now, and "they would reap more of that fame and reputation" which Mr. Mansfield refers to at the end of his paper. With the noble sentiments of his concluding paragraph one must fully agree, and as one who has travelled far and studied a long time, that he might not only see, but understand and appreciate the works of the great architects of past ages, the members of this architectural institute of New South Wales may depend upon me, a member of the sister profession of engineers, to do all in my power to help to exalt their noble art in this city, and (using Mr. Mansfield's own words) put it "on the

same proud pedestal in this Australian land as she occupies in the European world." Mr. Dawes, of Melbourne, spoke on the part of the engineers; Mr. John White, Mr. Jones, Mr. Carpenter, Mr. McIntyre, Mr. Prichard and Mr. Davy for the builders.

THE CHICAGO EXHIBITION AND ITS SUCCESSOR.

VIEWED from the standpoint of art, and regarding architecture exclusively as a fine art, the outer aspect of the Exposition has disappointed every one in being grander, more harmonious and in every way appealing more fully to the sense of fitness to its distinctive purpose than had been anticipated. That distinctive purpose was, however, limited to an exhibition or display of what has been accomplished in all branches of work. This show is arranged without much regard to the progress of each art, and little or no effort has been made to present the historic and systematic development of each branch of industry so as to make it as instructive to the student of social science as it is interesting and entertaining to the everyday visitor who comes only to witness the wonders which have been achieved.

The distinction which is intended is witnessed in the largest building, devoted to manufactures and to the liberal arts.

The section which is devoted to manufactures is a great bazaar, lacking only the element of sales and purchases in its resemblance to a huge salesroom. As such it is admirable and effective, but one who desires to study the development of manufactures must search long and wearily, and even then will get a very incomplete conception of how the work is done by researches both in this or in the Machinery Building.

On the other hand, the department of the liberal arts contains a very complete and systematic exhibition of the processes and methods of education from the kindergarten to the university included. A true industrial exhibition would show every step in the process of conversion of the fibre from the field through the factory to the bazaar for the display of the fabrics; every step in the conversion of ores and coal through the furnace, the mill and the machine-shop into the tool or the machine.

It is true that one already informed may make such a research on many lines, but there are very few examples of systematic and complete development in the processes necessary to the production of any one group of important products, so arranged that the progress of the art can be readily comprehended. . . .

One of the exceptions may be found in the exhibit of the Baltimore and Ohio Railroad Company, which is historically complete. In fact, the Transportation Building, its appliances and its contents, may be almost wholly excepted from the criticisms which are submitted on most of the other principal structures.

The Fisheries Building, of which the sole purpose is to mark the present stage of science in its application to the work, may also be named as one of which the motive of the architect has been wholly consistent with its purpose. . . .

On the other hand, it must, I think, be admitted that, so far as the construction of the most of the principal buildings are concerned, admirable, successful and satisfactory as they are for the limited purposes of display which have been named, there is only here and there a single and somewhat inconspicuous building from which any lesson can be learned that can be applied in practice outside the purposes of an exhibition of this kind. The art is there, the artist is there, the purposes of a great show are fully met in a high sense, and not in a low one, but that is the end of the matter. Aside from a few elements of construction, especially in the trussed arches of the Manufactures and Liberal Arts Building and a very few of the less conspicuous buildings, there is hardly a building in the grounds from which any lesson can be drawn for application in the common arts of life.

It may happen, perhaps, that some of the best lessons in architecture which will be derived from the Exhibition may be learned by a study of the little two-story brick house to which very few of the common sight-seers give any attention, which has been set up as a model dwelling-house for persons of small income by the people of Philadelphia, or from the workman's cottage, built of wood, which forms a part of the New York State exhibition.

The Machinery Building, for instance, is a superb building; it covers-in and shelters from the weather a wonderful miscellaneous exhibit of machinery; yet the building has no relation to its contents, and there is no typical machine-shop or factory building within the grounds. No one visiting the Machinery Building would learn from that how to construct a machine-shop or a factory in which machinery is to be operated. The art displayed in this building has no relation to its purpose, and is wholly unsuitable as an object-lesson in industrial construction. In modern practice, the building is a part of the mechanism, and art cannot be fully and truly exhibited except in a building which is developed from the interior motive of the branch of industry that is to be conducted in it.

It may be held that the great fault of the architecture of this country, especially manifested in this Exposition, is that the æsthetic conception of the architect is not governed by the motive of the building itself. The whole architectural display is wonderful, beautiful and satisfactory within the limits of its purpose. It may be wholly justified because its scope was limited, yet how little there is in this grand display of architectural skill that can be carried away from the gates of the Park for application to any purpose whatever except a similar show.

There are typical examples of American architecture so far as such term has any application in some of the State buildings — some very good, some very bad. May not the reason, perhaps, be that we have no national school of architecture, that we have not yet emerged from the condition of being copyists of other types developed under totally different conditions from our own. Even in copying we have only succeeded in rare instances in developing true art, especially in industrial buildings. In city warehouses greater progress has been made, but more remains to be done than has yet been accomplished.

Leaving this exterior aspect of the Exposition, we may now deal with its real motive, and seek to define the great forces from which it has, in fact, been developed, although perhaps not on the lines on which the next International Exposition will be established. These underlying material forces, of which Chicago itself is but an expression, are food, fuel, timber and metal. The immaterial force, without which all these elements of life would go for naught, is the common school. To the student of social order, the exhibition of these underlying forces, the Columbian Exposition, leaves nothing to be desired. Wherever one goes these factors in human welfare are present.

After one who desires to comprehend the inner secret of this exhibition has taken the first impression of all the buildings from various points, it is better to begin a closer investigation in some of the State buildings. None can be selected more suitable than the building erected by the State of Washington, one of the youngest in our group of States.

On approaching it, the flag-staff of a single stick of fir over three hundred feet high will call attention to the foundations, which consist of the timber of Puget Sound, the source from which nearly the whole supply of useful timber for all countries that border upon, and and of all the islands or continents within the Pacific Ocean must derive their supply, the timber of the tropics and southern hemisphere being, as a rule, either too hard to work for ordinary purposes or too soft for common use.

Passing up the steps of the annex, one enters rooms in which an exhibit is made of the public schools of this young State, from the kindergarten to the high-school, inclusive, marking a development of free education among the people which cannot yet be equalled in Great Britain. Passing from that to the central room of the building, one witnesses a wealth of products, especially grain in all varieties, that cannot be excelled even under the most scientific system of high farming in any other country, the first conspicuous exhibit being a pyramid of bags of wheat containing in all one hundred and one bushels, with a fraction over, certified to have been the product of a single acre of land. Passing by the artistic model of a Washington farm in the centre of the room, showing all its appliances and all the elements of mechanism that are made use of, one finds in the next annex a display of ore and coal which will prepare him in some measure for what will be examined later in the Mining Building.

Bearing in mind the growing scarcity and increasing cost of coal in European countries, the student will not fail to remark the single lump of coal, wrought out in one piece from a Washington mine, weighing over fifty thousand pounds. It may seem extravagant to say that the resources of this country in fuel, as compared to all others, bear the ratio which that lump of coal bears to the ordinary fragment quarried from the mine, and yet that would not be a very extravagant statement of the fact. This great display of coal and coke is flanked on every side by equally abundant and excellent examples of ores of iron and of timber in its secondary forms that cannot be excelled.

The pictures upon the walls, not, perhaps, great in artistic merit, yet bear witness to the wonderful variety in the views of the forests, the glaciers and the mountains of the State.

Passing on from the Washington State Building to those of Iowa and Illinois, one finds again the grains and grasses made use of for decorative purposes in such profusion as to confuse the mind, coupled again with examples of deposits of coal and ore of every useful kind — sometimes many varieties from one State, at least one variety in abundance from nearly every great Western State which is known chiefly as a grain-growing State. Fortunately for the welfare of these agricultural States, in which the truly precious metals are found in such abundance, mines of gold and silver are not within their limits; they are confined to a few of the States and Territories that have not yet held an important place in agriculture, with the exception of California.

The great productive grain-growing States have nearly all of them been saved from the speculative and gambling phase which has led to so much waste of capital and to so many misfortunes in the mining States, while their products of grain combined so much exceed in value the relatively insignificant products of gold and silver as to make the comparison almost ludicrous. There are many grain-growing States in which the value of a single crop of that one State exceeds the product of the whole country in gold and silver. To the superficial mind, the glittering display of gold and silver ores and of their products, occupying some part of the State exhibits in many buildings, will be very attractive. To the mind of the student of social science, they are as rubbish compared with the display of food, timber, coal and iron.

Passing from the consideration of these great products in their crude forms, one may follow them through all their transformations; he may witness in complete and well-arranged exhibits in the Transportation Building the work of the engineer, by which distance has been sunk into a fraction of a cent a ton a mile. In the Agricultural Building he will find very numerous examples of the machinery by which the actual cost of human labor in the production of wheat, of which the four-pound or quartern loaf serves as the measure of the daily bread of the workingman and his family in England, has been reduced to so insignificant a fraction in terms of money that there is not a coin in Great Britain small enough to serve as the measure of the quantity of labor in a quartern loaf — not even the farthing. . . .

When the next exhibition shall be established at a tithe of the cost of the one now open at Chicago, less in area, but far greater in its influence and its impressiveness, it may not open a vision in its first aspect of what one of my friends called an "Hellenic dream," but it will be something yet more grand. It may happen that the architect of the future will be not only artist, but engineer, as he must be in order to be a master of his profession. On the lines of peace, good-will and plenty he will develop great examples of architecture corresponding to those of Michael Angelo, Leonardo da Vinci, Brunelleschi and others, whose works are immortal, although they were inspired only by a religion which has become superstition, and which found its expression in buildings of which the cost was largely met by the sale of indulgences. . . .

In laying the foundations of the next exhibition, the engineer, the craftsman and the student of social science will alike be called to the aid of the architect before the plans are determined.

It may be assumed that in the year 1900, or before, another exhibition may be called for. It is probable that before we reach that period the art will have been perfected of converting materials of low cost into a true artificial stone, of which the "staff" made use of at Chicago is but a beginning. The age of clay and of cohesive tiles will have been reached. We may then have exhausted the age of timber, of iron and of steel in the art of construction. A fire-proof building will then be within reach at as low a cost as the slow-burning building is at the present time, at far less cost than the so-called fireproof buildings are now constructed, which so often betray the confidence of those who have trusted them. The art of combustible architecture, as commonly practised at the present time, consisting of a cellular tissue of wooden flues covered-in by a sham of stone, iron or brick on the outside, will then, I trust, have become a lost art, buried deep in the ashes of property consumed by fire at the present rate of nearly $150,000,000 a year, which may be mainly attributed to its practice.

A place for the next exhibition may be secured in the neighborhood of some great city where the visitors can be housed and fed, and towards which improvement is tending. An area equal to the requirements of a model town will be laid out, not with a view to the construction of buildings that will vanish like an "Hellenic dream," but with a view to laying out a true centre of industry, in which every building, as well as its contents, will mark the progress of science and invention in the useful arts.

It may happen that by that time, or sooner, it will have become safe to call upon the professional architect to aid the engineer in putting up industrial buildings, to the end that they may no longer be examples of all that is dreary, commonplace and ugly in construction. The true architect may then have learned to subordinate or to develop his artistic sense so as to render it consistent with the motive of the building which he is called upon to plan.

Within buildings thus constructed with a view to permanence, among which dwelling-houses may be mingled for the purpose of exhibiting progress in domestic architecture, and in the fitting of houses with simplicity and good taste, all the arts on which modern life rests for its comfort and welfare may be exhibited from the beginnings to the present stage in the progress of their development.

The building devoted to manufactures will not be a great bazaar or show-place; it will be a factory glorified by the imagination of the architect who can conceive of all the services that are rendered by him who builds and those who work in the factory, and in that conception may find inspiration. It will be constructed at far less cost in ratio to the space provided than almost any building in Jackson Park. It will possess the factors of light, air and ventilation, in which many of these buildings are wanting in fullest measure. It may be readily warmed in winter; yet more, it may be easily cooled in summer; it will be consistent with the setting up and permanent operation of every machine that is to be exhibited within its walls. While in use for purposes of exhibition, it may contain every type of textile art and practice thas has ever existed since the historic world began. . . .

Yet grand in conception and in construction as the Exhibition of 1900 may be, it will bear little resemblance to the present exhibition at Chicago. There is nothing constant but change. Of all that was exhibited in the first World's Fair of 1851, scarce anything but the idea and motive remains. The form and substance in which that motive was then cast have been thrown aside; nearly all the mechanism has become waste iron, steel and copper. Scarcely anything of that which was exhibited in the Centennial of 1876 now possesses any value for use in the form in which it was then constructed. Nearly every machine, every process and every form of art and industry that is now on exhibition in Jackson Park will in a single generation have vanished like the "Hellenic dream" that will disappear when the existing buildings are removed, never to be repeated.

The form and substance of the Exhibition of 1900 will then be another passing change, subject again to reproduction in another generation, when every form of capital will have become more perfect, and the rule of social order which is now being so rapidly developed will govern all who have any faith in the Higher Power which makes for righteousness. That rule is that, in proportion to the increase or to the effectiveness of capital, the share of the annual product that falls to the capitalist is increased absolutely, but is diminished relatively to the product. On the other hand, the share which falls to those who do the actual work in the operation of the machines and tools which form a part of our capital is augmented both absolutely and relatively to the end that, as time goes on, all the benefits of science and invention are distributed among the great mass of the population, justifying their application to productive industry by the development of common welfare as well as of individual wealth.

It may happen, however, that although the buildings that may be constructed for the Exhibition of 1900 will themselves be subject to displacement in one or two generations, yet at the time, and for many years after the exhibition has ended, they may remain in use as examples of the best types of science and invention and of architecture that had been attained at that period.

When these model structures are all built on unoccupied ground in the neighborhood of some great city, at a tithe of the cost of those which now excite our admiration at Chicago, and when they are connected by examples of the best highway and railway construction with that neighboring city, will such a collection of buildings vanish in a day like the "Hellenic dream"? Far from it. It will have become the model town in which many of those who have joined in the exhibition will desire to remain and to continue to practise the arts of which the historic development has already been brought into view. The best and most modern type of every example of mechanism and every process, having secured a standing in that model town, will stay there, giving value in use to the grounds and to the buildings far greater than their cost.

If this is a vision, may there not be men either near Chicago, where so much has already been accomplished, or next some other great centre in this country by whom this vision may be brought into solid substance, completing the work of which the Columbian Exposition, grand and beautiful as it is, is itself but the shadow? — *Edward Atkinson in the New York World.*

THE MIDWAY PLAISANCE AND ITS ATTRACTIONS.

THERE is one part of the Fair which has given rise to a greater number of opinions, more controversy, and, in fact, more expression of excited feelings, than all the rest of it put together. This part is that known as the Midway Plaisance, and here, at the outset, in the very pronunciation of the name, two distinct parties spring up. The word, in the old charts of the park grounds, is most certainly spelled "Plaisance," and is supposed to be the French word, as our English word of that spelling, according to the "*Century Dictionary*," is an obsolete one, the present form of which is pleasance, pronounced "plézans." There is, naturally, a large majority of uneducated people, who, glorying in the unusual luxury of a French word, bring out the good English Midway with indifference and the Plaisance with all the glory of the z sound in the middle, and the accent on the last syllable, which becomes with them an exaggerated *aunce*. There are, of course, many educated people who follow the general custom without much thought, while opposed to them is a feeble minority, who maintain that Midway should be coupled with a word as English as itself, and insist upon walking in a pleasance, as their ancestors have done before them for many a long year in Merry England.

And here controversy does not stop. The Midway (thus do we avoid the mooted question when feelings are too keen on the subject) consists, as every one knows, of one long street, opening upon which is a large collection of most interesting side-shows, made by the various more or less civilized nations from all over the globe. Their modes of living, their pleasures, their costumes and customs and their dwellings are all depicted. Though, of course, these shows savor somewhat of the catch-penny order, they are extremely interesting. In some of the less civilized nations they do not exactly harmonize with either our or Anthony Comstock's ideas of conventionality and propriety, so the Lady-managers, during the lulls in their internecine war, have flown to arms, and have uttered the warning note that such immorality as our youths had never dreamed

of was being laid out in attractive form before them. Of course, after such a declaration, no power on earth could keep the said youth away from the place, and the attractions must, therefore, cease. One enterprise, the Persian Theatre, they successfully battled with, but the rest of the theatres, dance-houses, etc., are still enjoying their merry existence, so the architectural student who would study some of the quaint and curious buildings in which the Midway abounds must run the chance of being overcome by the charms of some Dahomeyan amazon or flabby Oriental, unless he be fortunate enough to possess a friend among the Lady-managers who may be willing to *chaperone* him. But, be it said in all seriousness, to the architectural student who is desirous for and unable to attain to a sketching-trip abroad, this comparatively small section, the Midway, will afford more varied and unusual subjects than he would find in a long and expensive journey. There are, indeed, here, in this somewhat scorned and rejected portion of the Fair, more subjects for quaint and curious architectural sketches than in all the rest of the exhibition put together. It is really a pity that some serious work cannot be enjoyed in this place from models that have evidently had so much time and thought spent on them.

On entering the Midway, one of the first shows one comes to is the Irish village, where Blarney Castle rises above the low buildings. The cottages are of staff, treated with a rough surface, and when thatched roofs are used, as they are in a few, are rather picturesque, though the introduction of shingles on many of them causes them to lose their distinctive character. A beautiful feature, though, of course, a small one, is a really fine Gaelic cross on the village-green, where Patsie Flannigan daily dances an Irish jig, and sings "Kathleen Mavourneen" and the "Low-backed Car." If you avoid the time of these entertainments, as far as the crowd is concerned, there might be a chance here in even this, one of the least picturesque of the shows, for one or two good sketches. At one corner of the place is the cloister of Muckross Abbey, and, if we can believe the exclamation of one Hibernian lady, "Oh, Mary, if this *isn't* Muckross Abbey!" must be a very good reproduction of the original.

Across the main street from this Irish village is a little panorama of the Alps, the only architectural feature of which is a curious little proscenium-arch evidently used for some miracle-play in the Old Country. This show is, however, strictly moral, even the ladies who yodel and sing "Du Bergen lebe wohl" to the strains of the zither are kept *behind* the curtain.

Close to this the Libby Glass Company makes a very interesting display, one of the features of which is the spinning of glass-thread and subsequently the weaving of it into a most brilliant textile. This cloth, if so it may be called, is used for tapestrying the walls of one of the small show-rooms and would make a really beautiful substance for the treatment of the walls of some state drawing-room, if used in the place of satin or brocade. It seems quite flexible, and can be plaited or laid smooth, and would not seem as likely to be harmed by dust and smoke as silk. Its chief drawback would be its cost.

In the Murano Glass-works, nearly opposite to the Libby, one part of the working-exhibit consists of the production of mosaics, the subjects being old Venetian reproductions or modern designs, treated in about the same style.

The first of the villages where one feels far away from European civilization is that of Java. The houses in which the natives seem to live are not only thatched, but the walls are formed of prettily woven straw-matting. The houses are raised from the ground on posts more after the manner of the Siamese houses, though not so high as these, and the thatched roof slopes down over the little porch which seems to be at the front of each house. The outlines of the houses are very pretty and a decorative effect is further gained by the ridge-poles being twisted with some dark brown or black fibre, and by their terminating in spreading horns twisted in the same way. Some quite large structures are built in this same manner, the only difference between them and the more modest edifices being that of size.

Next in Midway attractions of any great importance is that known as the German village. This is most carefully carried out and affords several very charming examples of German mediæval open-timber construction, notably the "Hessian Town-hall" and the "Westphalian House." The "Black Forest House" is especially picturesque with its long sloping thatched roof, and its irregularity of eaves' line and façade. It contains in its upper floor an old Gothic room from the Tyrolean Alps of the time of the middle of the fifteenth century, and another from the southern slope of the Black Forest of two centuries later. An Upper Bavarian house, with its quaint ornamental devices of a semi-religious nature, is another attractive building of the place. A quite valuable museum is housed in a moated castle of mediæval times, while the restaurant which is established in the back part of this building is in quaint and attractive rooms. The castle is, of course, of staff, and where the wall touches the rush-bordered moat, the plaster is beginning to fall off. The design, however, of the whole building is striking and characteristic and would, as well as the other buildings mentioned, make really charming and suggestive sketches if one could give to them the time for such work. You enter the castle over a drawbridge where an ancient German *Ritter* condescends to receive your quarter-of-a-dollar.

Still farther to the west of the German village on the same side of the thoroughfare is the Street of Cairo, and here the Oriental illusion is quite complete. Here the donkey-boys and their wise-looking little beasts flourish in true Eastern vigor, here the camels swing their ponderous bulk up and down the narrow street, here you meet Nubians with their greased locks and dirty draperies, Soudanese with their tinkling goat-hoof belts, Arabs, Turks and Jews. For the artist the Eastern atmosphere is doubtless wanting, but to the architectural student these latticed windows and narrow doorways, these white minarets and picturesque walls, uneven in form and color, afford most excellent subjects for study and sketching. The old Moorish windows of natural unpainted wood in which the street abounds are especially attractive. To sketch, it would be necessary to visit early this most popular corner of the Midway to find a spot quiet enough for work. In nearly all of the other places, hasty, and perhaps, in some, even more leisurely sketching, would be quite possible. The winding street at Cairo is closed at its western end with an Egyptian temple covered with bright-colored hieroglyphics and although in this structure one hardly gets the dignity of the rock-hewn pile at Ipsanboul, for instance, still the shutting out of an Occidental feature that might arise on the outside is a good one, and the illusion is made more complete.

Next to Cairo stands the Algerian bazaar. The central feature of this is the theatre, while from either side of this are two arcades laid out in semicircles. The arcades are formed of Moorish arches, all of white staff, with blue and green tiles introduced, and form a very pleasing feature of the Midway.

"Old Vienna" is the name given to what would probably answer as well for any other old German walled-town of the Middle Ages. The theme is very carefully studied, and the result, both from the central street of the Midway and the interior court of "Old Vienna" itself, is very successful. Gabled and high-peaked roofs, decorated walls and the picturesque eccentricities of Mediæval German work here abound.

As we approach Old Vienna we pass the huge Ferris wheel, too well-known to need any comment here, and upon leaving Old Vienna we approach the settlements of more of the less civilized tribes. In the Samoan show the houses of the natives are not devoid of interest. They are round, hut-like structures, built on circular posts, the conical thatched roofs of which start at about four feet from the ground. A kind of straw-matting is rolled up at the eaves evidently to be let down in case of rain. The utmost peak of the roof must be about eighteen or twenty feet high. The entire finishing of the interior consists of a hole hollowed out in the ground for fire. The structure as well as the heavy wooden boat of the natives is entirely held together by means of a tough vegetable fibre.

Still farther down in the grade of comfort are the huts of the Dahomeyans, inasmuch that these admit of little light and air. They are straw huts, both as to roofs and sides, and are only interesting as being characteristic of the primitive people.

FOUNDATIONS.

PROBABLY of all the various systems employed for putting in the foundations of bridges, the pneumatic method is the least exposed to accidental interruptions. Even when the site can be laid bare by means of a coffer-dam, serious leaks may occur at any moment, and there is also the risk of floods, so that the engineer in charge has an anxious time of it till the masonry has been raised above water-level. By suitable precautions these risks can, no doubt, be minimized, and where the water is comparatively shallow, and one is not tied for room, the use of a coffer-dam will usually be the most economical plan that can be adopted. Much of the trouble experienced with such works is due to an insufficient allowance of room inside the dam. The inside dimensions should be, where possible, at least six feet more than the extreme dimensions of the foundation plus an amount equal to depth of excavation below the river-bed. Where as much space as this cannot be afforded, it is a good plan, after pumping out the dam, to drive stout sheet-piling around the exact site of the foundation. By means of walings and poling boards, the foundation can then be sunk to firm ground without fear of slips, which might endanger the safety of the dam. In such cases the foundation up to the river bed is conveniently made entirely of concrete, as then there is no necessity to remove the timbering supporting the sheet-piling, and it may accordingly be left in place.

Pile foundations are also often economical, but too frequently the piles are ruined by over-driving. It is far better to drive such piles to a moderate penetration, and use more of them. The cost of the extra piles will be largely made up by the less cost of driving. The practice of driving them to "refusal" cannot, as a rule, be too strongly deprecated, as a bass broom makes a poor sort of column, however efficient it may be as a sweeping implement. When drawn, as they occasionally are, over-driven piles are found to be split, bent, their ends crushed, and to have cast their shoes. In soft strata, piles will drive straighter and easier if they are not pointed or shod. When brought to a point, as is usual, it is impossible to keep them straight should a boulder or tree trunk be encountered when driving. In such cases, unless the point strikes the obstruction perfectly fair and square, it is sure to be deflected, whereas with a square-ended pile there is less risk of this. In compact sand it is impossible to drive piles to any depth by blows, but by the use of the water-jet they can easily be sunk any required distance. The safe load on piles under these conditions is difficult to estimate. They are held

in place partly by the friction of the sand against their sides, and partly by the upward pressure at the point. If we adopt Rankine's theory of earth pressure, the resistance of the pile should then be

$$R = A\,w\,x\left(\frac{1+\sin\phi}{1-\sin\phi}\right)^2 + \frac{S f w x}{2}\left(\frac{1-\sin\phi}{1+\sin\phi}\right),$$

where

$A =$ effective area of cross-section of pile.
$w =$ weight per cubic foot of material into which it is driven.
$x =$ depth in feet to which it is driven.
$\phi =$ angle of repose of the material.
$S =$ surface of pile exposed to friction.
$f =$ coefficient of friction.

The first term is that due to upward pressure on the bottom of the pile, and denotes the load which can be placed on any area without settlement, when the surrounding area is loaded with $w\,x$ tons per square foot. If this load is exceeded, the foundation sinks, and the surrounding earth rises. In the case of a pile, however, the friction of the earth against the sides of the pile tends to prevent this rise of the surrounding material, and the practical effect is to increase the area of the base of the foundation. In addition to this, the friction on the sides tends of course to support the pile directly, as indicated by the second term of the above formula. The most uncertain element in this formula is the angle of repose ϕ. The less this is, the greater is the frictional resistance of the pile, and the greater the effective area of the pile, but the smaller is the factor

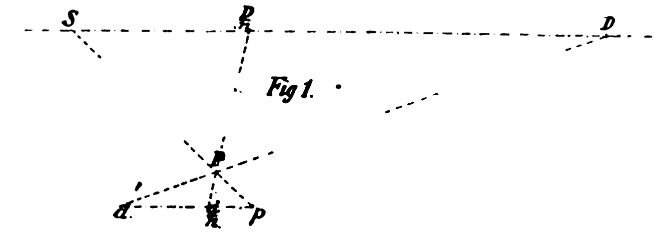
$$\left(\frac{1+\sin\phi}{1-\sin\phi}\right)^2.$$

These two considerations tend more or less to balance one another. The whole question is, however, beset with difficulties, but we do know that the resistance of piles driven into soft strata is often very remarkable. Thus piles driven thirty feet into such soft material that they went down from ten-inches to twenty inches at the final blow, have safely carried the heaviest railway traffic for years, the load amounting to about seven or eight tons per pile. In fact, on testing some of these piles after they had been in place some months, they could not be moved further with the heaviest drivers available. Had the load been calculated from the last penetration of the pile when originally driven, the piles would have been loaded with considerably less than one ton. From these considerations it is obviously, in important work, advisable to determine the true bearing-power of a few piles by direct loading, the experiment being made some days, or, still better, some weeks after the driving. Where the strata is fairly firm, this great increase in bearing-power does not seem to take place, and the safe load can be calculated from the penetrations in the original driving.

The great danger to which pile foundations are subject is scour. One method of protecting them against this is to sink a cast or wrought iron cylinder round them to a depth below which no scour is to be feared. The space between the piles and the cylinder is filled up with concrete, and the group is thus effectively braced together. This plan is often cheaper than sinking the whole cylinder to a firm stratum by dredging. The piers thus formed are usually small in diameter, and have not much transverse stability. Hence for railroad bridges, where considerable longitudinal forces may come into play by the action of the brakes, they should be adopted with caution. In the case of ordinary road bridges, however, this point is of less importance, as such bridges are not exposed to longitudinal strains. The principal transverse stresses on the piers are then due to wind-pressure, which is easily provided for by bracing a couple of the cylinders together in the usual way. These cylinder piers have very considerable advantages in many cases, though in England they are not supported on piling, but are carried down to a firm stratum by dredging. If obstructions are met with, a diver can be sent down, or if the matter is more serious, it is easy to close-in the open top and complete the work on the pneumatic system.

Where larger piers are required in fresh water, there is much to be said in favor of the American system of building the under-water portion of the pier largely of wood. Much ingenuity has been expended, both in England and on the Continent, with a view to reducing the amount of metal left permanently in large piers sunk by the pneumatic or Indian well system. All the iron left in such piers is practically dead loss. Its supporting power is not taken into account, as it is necessary to fill the caissons with concrete, practically as much of this being required as if the metal were absent. True, it protects the iron inside it for very many years from injury, but it can hardly be expected to do so indefinitely, as in the long run rust must tell its tale. Timber, on the other hand, is practically indestructible when kept completely immersed in fresh water. It softens somewhat, it is true, but its strength remains ample for any load likely to come on it. As regards speed and ease of construction, there is no comparison between the use of iron and wood. The latter is incontestably superior. The material is brought to the site in convenient sizes, and worked-up into the pier with practically no other tools than augers and saws. Stone or concrete is built up with the wood, so that the buoyancy may not be too great, and when ready it is floated out to its site, without any such special arrangements as are needed with iron. When there it is grounded by weighting it with gravel or concrete, and the remainder of the sinking completed by the open dredging or pneumatic methods. — *Engineering.*

SOME CONSTRUCTIONS IN LINEAR PERSPECTIVE.



IN the preparation of this paper it is assumed that the reader has some knowledge of the principles of Perspective. It explains a few simple constructions which will facilitate the operations of the draughtsman by avoiding the use of vanishing-points which fall beyond the frame of the picture, and thus enable him to do his work wholly within the limits of the plate or canvas.

Recalling the most elementary construction in Linear Perspective, let p (Fig. 1), be the projection on the picture-plane of a point in space which is situated a given distance d from the picture-plane. Let S and D be respectively the points of sight and distance. From p draw $p\,d$ parallel to the horizon and equal to the distance d from the point to the picture-plane. Draw $p\,S$ and $d\,D$. These lines intersect at P the perspective of the given point.

The same result may be obtained as follows: from S lay off on the horizon a distance $S - \frac{D}{n}$ equal to any n^{th} part of the distance from S to D; also from p lay off a distance $p - \frac{d}{n}$ equal to the same n^{th} part of the distance from p to d. From $\frac{d}{n}$ draw $\frac{d}{n} - \frac{D}{n}$ intersecting $p\,S$ at the same point P.

From an inspection of the geometry of Figure 1, we see that any fractional part of the distance $S - D$ may be laid off on the horizon provided the same fractional part of the distance $P\,d$ be laid off on this line.

The application of this construction to drawing the perspective of a solid situated at any distance from the picture-plane becomes a simple matter.

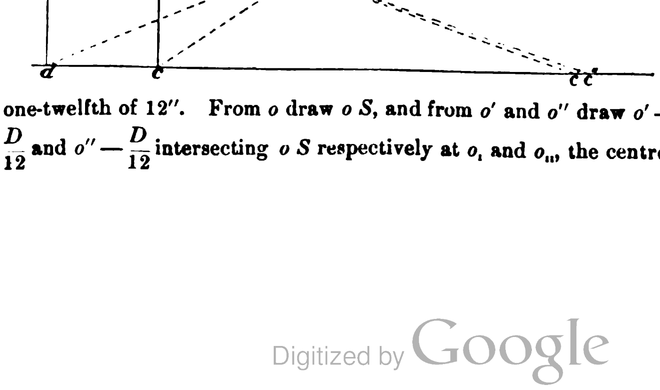
The points of distance are supposed to be three feet from S.

Example 1.— To draw the perspective of a prism whose base is 4″ square and altitude 12″; the solid to be ten feet from the picture-plane; the rectangle $a\,b\,c\,d$ (12″ × 4″), Figure 2 being its projection on the picture-plane.

From each of the points a, b, c and d draw lines to S. Lay off on the horizon a distance $S - \frac{D}{8}$ equal to one-eighth of three feet $=$ 4½″. Lay off cc' one-eighth of ten feet $=$ 15″; and $c'\,c''$ one-eighth of 4″ $=$ ½″. From c' and c'' respectively draw $c' - \frac{D}{8}$ and $c'' - \frac{D}{8}$ intersecting $c\,S$ at $c_{,}$ and $c_{,,}$. Having obtained these points the draughtsman will readily complete the figure.

Example 2.— To draw the perspective of a cylinder whose projection on the picture-plane is Figure 3; the diameter is 6″; length $=$ 12″. The solid is to be nine feet from the picture-plane.

Lay off from S to $\frac{D}{12}$ one-twelfth of 3′ $=$ 3″. Through o the centre of the circle, draw $o\,o''$ parallel to the horizon. From o lay off $o\,o'$ and $o'\,o''$ respectively 9″, and 1″, *i. e.*, one-twelfth of nine feet and

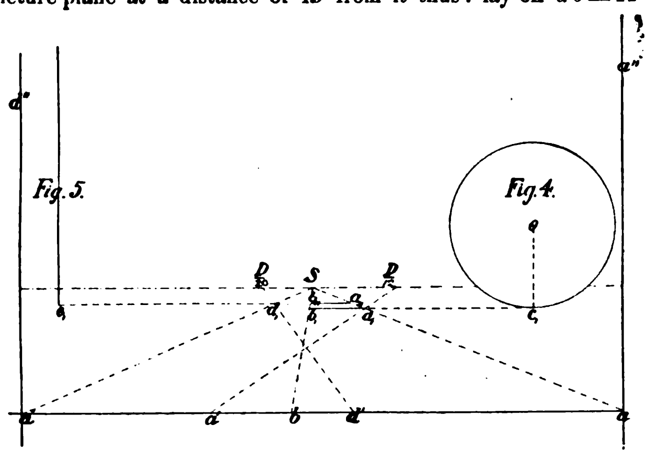


one-twelfth of 12″. From o draw $o\,S$, and from o' and o'' draw $o' - \frac{D}{12}$ and $o'' - \frac{D}{12}$ intersecting $o\,S$ respectively at $o_{,}$ and $o_{,,}$, the centres

of the perspective circles — the radii of which the draughtsman will readily determine by an inspection of the figure.

Example 3. — To draw the perspective of a circle (Fig. 4) one foot and a half radius, the plane of the circle being parallel to the picture-plane, and situated at a distance of 15′ from it; the projection of the centre falling 3′ beyond the limits of the paper and $1\frac{1}{2}'$ above the horizontal plane.

Draw a line $a_1 b_1$ 12″ long in the horizontal plane parallel to the picture-plane at a distance of 15′ from it thus: lay off $ab = 12''$;



draw aS and bS. Find a point a_1 on aS at a distance of 15′ from the picture-plane as follows: lay off $S - \frac{D}{12} = 3''$; also $a - a' = \frac{15'}{12} = 15''$. Draw $a' - \frac{D}{12}$ intersecting aS at a_1. Draw $a_1 b_1$ parallel to ab; $a_1 b_1$ is the perspective of the line, and may be employed as a 12″ scale, from which measurements may be laid off on lines situated at a distance of 15′ from the picture-plane.

We will suppose that aa' represents the limit of the drawing-paper. Draw aS. Produce $b_1 a_1$ and lay off $a_1 c_1 = 3'$; erect the perpendicular $c_1 o$ and make it equal to the height of the centre of the circle above the horizontal plane *i. e.*, $1\frac{1}{2}'$. With o as a centre and a radius $= oc_1$ describe the perspective circle Figure 4. All of these measurements are taken from $a_1 b_1$ which may be called *the perspective scale*. The accuracy of the drawing may be tested.

The length of the line $a_1 b_1$ should be equal to its true length ($= 12''$) multiplied by the fraction whose numerator is equal to the distance from S to D ($= 3'$), and denominator equal to the distance from the line to the picture-plane increased by the distance from S to D ($= 15' + 3'$). The fraction is then $\frac{3}{15 + 3} = \frac{1}{6}$. Therefore the length of $a_1 b_1$ $12'' \times \frac{1}{6} = 2''$.

Example 4. — To draw the perspective of a perpendicular line (Fig. 5) 6′ long and 20′ from the picture-plane, the projection falling 5′ beyond the limits of the paper.

Let dd'' represent the limit of the paper. Draw dS. Find a point d_1 20′ from the picture-plane — thus: lay off $S - \frac{D}{20} = 1.8''$; also $d - d' = 12''$ or one-twentieth of twenty feet. Draw $d' - \frac{D}{20}$ intersecting dS at d_1. From d_1 draw $d_1 e_1$ parallel to the horizon. This line contains the foot of the perpendicular $e_{\prime\prime}$ whose distance from d_1 will be equal to 5′ multiplied by the fraction $\frac{3}{20 + 3} \left(= \frac{3}{23}\right)$; *i. e.*, $5 \times \frac{3}{23} = 7.83''$. The length of the line (Fig. 5) is equal to 6′ multiplied by the same fraction *i. e.*, $6' \times \frac{3}{23} = 9.4''$. F. R. H.

ILLUSTRATIONS

[*Contributors of drawings are requested to send also plans and a full and adequate description of the buildings, including a statement of cost.*]

ILLINOIS STATE BUILDING AND SURROUNDING STRUCTURES. MR. W. W. BOYINGTON, ARCHITECT, CHICAGO, ILL.

[Gelatine Print, issued with the International and Imperial Editions only.]

CHURCH OF THE HOLY SEPULCHRE, JERUSALEM.

IF the building in Jerusalem most revered by Moslems be the Mosque of Omar, the one most reverenced by Christians is the Church of the Holy Sepulchre. It is an enormous edifice with but very little claim to architectural beauty, founded about 300 years after Christ by the Empress Helena, mother of Constantine, first of the Christian emperors. In one sense it can hardly be called a church at all; it is rather a sacred exhibition building. Beneath its enormous roof are many chapels, altars, shrines, hills, caves, valleys and monuments commemorating all the localities mentioned in the Bible which can by any possibility be situated in Jerusalem. Among the places supposed to be identified within the limits of this church, are the Sepulchre of Christ; the summit of Mount Calvary; the places where Christ was scourged, crowned with thorns and annointed for burial; the spot where the true cross was found; the point where Jesus appeared to Mary Magdalen; the place where the Centurion stood during the crucifixion, and the grave of Adam. All these are the property of various Christian sects: Greeks, Latins, Armenians, Copts, Syrians and Abyssinians — all more or less jealous of each other and distrustful of each other's relics. Opinions of course differ as to the authenticity of these localities. But genuine or not, there is no doubt that the site of the Sepulchre itself has influenced the fate of nations more than any other spot on earth. It caused the greatest event of the Middle Ages (the Crusades) and for its possession and defence the best and bravest blood of Christendom has freely been shed.

BUSINESS BUILDING FOR JOHN SILVEY & CO., ATLANTA, GA. MR. G. L. NORRMAN, ARCHITECT, ATLANTA, GA.

THIS building, now under course of construction, is designed on the slow-burning principle with steel frame, solid wood floors and asphalt roof. The materials for the exterior are Georgia granite, Roman buff-brick and terra-cotta finish.

BUILDING FOR THE PROVIDENCE TELEPHONE COMPANY, PROVIDENCE, R. I. MESSRS. STONE, CARPENTER & WILLSON, ARCHITECTS, PROVIDENCE, R. I.

HIGHLAND INN, YORK, PA. MR. J. A. DEMPWOLF, ARCHITECT, YORK, PA.

THE BRITISH GOVERNMENT BUILDING AT THE WORLD'S FAIR, CHICAGO, ILL. MR. R. W. EDIS, ARCHITECT.

[Additional Illustrations in the International Edition.]

THE FINE ARTS GALLERY, WORLD'S FAIR, CHICAGO, ILL. MR. CHARLES B. ATWOOD, ARCHITECT, CHICAGO, ILL.

[Gelatine Print.]

NORTHWEST PAVILION OF THE AGRICULTURE BUILDING, WORLD'S FAIR, CHICAGO, ILL. MESSRS. MCKIM, MEAD & WHITE, ARCHITECTS, NEW YORK, N. Y.

[Gelatine Print.]

THE GUILDHALL, CAMBRIDGE, ENG. MR. W. M. FAWCETT, ARCHITECT, CAMBRIDGE, ENG.

THE Cambridge Town Council have long been much pressed for want of proper court and office accommodation, and have now resolved to make additions to the Guildhall which will supply new council-chamber, mayor's and councillors' rooms, police-court and county-court, with all the rooms wanted in connection with them. They propose also to build offices for town-clerk, town-surveyor, medical and other officers, so as to centralize the work of the town. The council-chamber and mayor's and councillors' rooms occupy the first floor to the front and the two courts face the side street, the offices being chiefly on the ground-floor. The basement has just been completed and tenders are being taken for the courts, so that they may be completed before the block they now occupy is pulled down. The original drawing was exhibited this year at the Royal Academy.

BIRMINGHAM MUNICIPAL TECHNICAL SCHOOL, BIRMINGHAM, ENG.: PLANS. MESSRS. ESSEX, NICOL & GOODMAN, ARCHITECTS.

ST. OMER, STRASBOURG, AFTER A DRAWING BY SAMUEL PROUT.

COMMUNICATIONS

[*The editors cannot pay attention to demands of correspondents who forget to give their names and addresses as guaranty of good faith; nor do they hold themselves responsible for opinions expressed by their correspondents.*]

CONSULTING EXPERT ADVISERS.

BOSTON, MASS., September 1, 1893.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — May I be allowed some space in your columns to call the attention of your professional readers to a matter, which, I think, will bear discussion, namely, the employment of experts for special work?

It will, I believe, be generally admitted that one of the chief duties of the architect after he has made designs for a building is to guard the interests of his client, and to see that he gets good honest value for his money, not only in the quality of the materials used in his building, but also in the manner in which they are used. To do this thoroughly and conscientiously in this age of "modern improvements," requires a large amount of experience and knowledge outside the limits of ordinary architectural practice.

Very few architects will, I think, claim to have a *thorough* knowledge of plumbing, heating and ventilation, or electric-lighting as applied to buildings of large size. Such subjects require not only special training and practical experience, but a different class of mind, a different temperament from the artistic and architectural, and moreover life is too short for any but a very exceptional man to master thoroughly more than one profession.

Some one may contend that all these specialties are included in the education of a well-equipped architect, and it is true that he should and generally does, have some knowledge of them, but a little knowledge — when it is made to do the work of a lot — is decidedly dangerous, and very few architects of any experience have the temerity to design large plants of the character mentioned, without assistance from outside.

Now comes the point I wish to call attention to: Where do they get this assistance? What is the usual method of architects when confronted with these problems?

Very often the matter is left till the last moment, perhaps till the walls of the building are up, and it is costly if not impossible to make modifications in the construction, no matter how desirable they may be. Then the plans are given out to several different contractors who are asked to submit schemes and proposals.

Sometimes the advice of a favored contractor is asked at an earlier stage in the proceedings, and the architect lays out the scheme, and makes the specifications practically under his directions. Now, are either of these methods — or the numerous modifications of them — in the interests of the client?

I contend that they most decidedly are not, and the reasons are so apparent, that I hardly feel justified in taking up your space to state them.

When a number of contractors are competing for a job, each making his own plans and specifications they realize the fact that only one of their number can be successful, that the chances are six or eight to one that any time they spend in studying the problem will have to be charged to profit and loss and that, inasmuch as no two contractors figure on the same basis, lowness of price is likely to have more weight with the architect and owner than real merit of design, quality of materials, efficiency, or economy in operation.

Is it reasonable to suppose under these circumstances that the client will get good honest value for his money? Sometimes, of course, he may do so, but it is a case of good luck rather than of good management.

With regard to a contractor acting as advising engineer, I contend that from a client's point of view, there are very serious objections to it. Contractors almost without exception are pecuniarily interested either as manufacturers or agents in from one to a score of different systems, devices, or patents, and it is part of their business to introduce these things regardless of whether they are really the best, safest and most economical for the particular work in hand. In saying this I do not wish to attack the honesty of contractors, but obviously, if a man has something to sell he is not an unbiassed judge of its merits, and he is not very likely to specify something else in its place. Only a few days ago I heard a leading contractor in this city, state that, if a man know his business, he can get an advantage of fifteen to twenty per cent if he be allowed to make the plans and specifications for a job. This, of course, is the reason why contracting firms are so ready to give engineering advice for nothing — even if they should by mistake lose the contract, they are sure of a profit on some part of the materials used.

Now why is it that architects so generally lend themselves to one or other of these methods? It is not because competent specialists in these departments are not to be found, but rather because architects feel they cannot afford to pay for such work out of their own pockets, and naturally take advantage of the contractor's offer to do it for nothing.

Possibly it appears to some architects doubtful policy to advise their clients to employ an expert lest their own commission on that part of the work be cut off, but such a fear only indicates that they do not really feel entitled to it — and perhaps they are not. Yet it is certainly more to the advantage of the client than of the architect to employ a specialist and therefore it seems as if the former should be willing to pay for it.

The views of some of your professional readers on the ethics of this question would be interesting, and I hope you will hear from them. Yours truly, K.

[SHARING to some degree the views of our correspondent, we sought a few years ago to bring about an alleviation of the present imperfect methods by bringing architects into communication with experts and so established a department for the advertising of "Consulting Experts." It flourished for a short while and then died a natural death. We will ask our correspondent, since he himself seeks occasion to give expert advice, how he hopes to find the opportunity if he do not avow himself? — EDS. AMERICAN ARCHITECT.]

A QUESTION OF COMMISSION FURTHER DISCUSSED.

NEW YORK, N. Y., August 30, 1893.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Your answer to my second letter first assumes that the agreement between my client and me was mutually understood to be proper compensation. Such was never the case. I plainly spoke of its inadequacy, and he understood my views and knew my usual customary rates.

It also assumes that all architects' work is on a par in percentage value, whereas there are parts of a building that can be planned with rich profit at one per cent, while other parts of intricate detail or long study would not pay at ten or twenty per cent.

I say this to show how inapplicable is your converse illustration of five and two per cent, and how the law of contracts for extra work — "Compensation at a fair and reasonable valuation" — so far from not applying at all, does apply even more to an architect than to the builder.

The architect virtually *never* furnishes the same thing twice, and to estimate his time or labor by some other labor he did once before would be the wildest inaccuracy. So with the tower in question. Much time was spent in study — many drawings were made and laid aside before final success in meeting the client's views. Then, too, like monument or decorative designing, it virtually came under a far different status or heading than the original contract. Your answer reduces all this work to the *pro-rata* that had covered walls, floors, etc., where the architect's commission runs up, but there is not much for him to do or expend; and you allow nothing for time spent in study to produce a success of what was virtually monument work!

I doubt whether your readers will not side with me that, despite precedent or any other argument thus far given, the "reasonable and fair valuation" is the only possible basis of proper compensation. Very truly yours, X.

[WE have read this carefully over several times, but, although there is a good deal of reason in it, we do not, on the whole, think that there is enough to make us change our opinion — that, in the absence of express notice, before the architect began to work on the extra tower, that the charge would be at a higher rate, the client was entitled to suppose that he would have to pay only the same percentage that was agreed upon for the original work. As to the claim that some portions of an architect's work are unremunerative at the usual percentage, while others would pay well at a smaller one, it must be remembered that, although this is true enough, it is the custom of the profession in all countries to leave this out of account, and to charge for all the work involved in ordinary building operations at a certain percentage, which, taking everything together, gives a reasonable average remuneration; and it would seem as strange to architects as to clients to have a bill for professional services made out by items — so much for designing the tower, so much for planning the foundations, and so much for the roof. Although such itemized charges might represent more truly the real value of the architect's work than a fixed five-per-cent charge for everything, long experience has shown that a fixed average charge is, on the whole, best for architects as well as clients, and we imagine that "X" would be as little pleased to have a client demand a reduction from a five-per-cent bill, on the ground that the building contained an unusual amount of plain brickwork, as his client would be to have an extra charge appended to it for "time spent in study to make a success of the tower." It must be understood in all this that we do not advocate a blind adherence to the Schedule, without any regard to the character and amount of work actually done, such as some architects profess. Every architect does many fragmentary pieces of work, such as making sketches too rough to be even called preliminary, partial plans, suggestions or improvements on existing designs, to which the Schedule cannot reasonably be applied, and, in order that the charge for such services may be fairly made, we think, and have often said, that a time-book should be kept, and the bill made out by reference to it, rather than by torturing the Schedule to cover the case, or allowing the inspiration of the moment to fix the amount. — EDS. AMERICAN ARCHITECT.]

NOTES AND CLIPPINGS

THE SOAPSTONE INDUSTRY OF CHINA. — The British Consul at Wênchow in his last report gives some interesting details respecting the manufacture of steatite or soapstone ornaments in China. The mines are distant 42 miles from Wênchow, and are reached by a boat journey of 35 miles up the river, followed by a land journey of 7 miles over rough ground. The hills containing steatite are owned by 20 to 30 families, who in some cases work the mines themselves, in others engage miners to do it on their account. The galleries are driven into the sides of the hills and are often nearly a mile in length. The composition of the hills is soft, and the shafts require to be propped up by supports of timber; for the same reason the floors are full of mire and clay, so that the miners wear special clothing, made principally of rhea fibre. They lead a hard life, living in straw huts on the hillside. The stone when first extracted is soft, hardening on exposure to the air. It is brought out of the mine in shovels, and is sold at the pit mouth to the carvers at a uniform price of about ½d. per lb. This would be when the purchaser buys it in gross, without first selecting it in any way. When picked over, the mineral varies very considerably in value — according to the size of the lump, its shape, and above all its colors. The colors are given as purple, red, mottled red, black, dark blue, light blue, gray, white, egg-shell white, "jade," beeswax, and "frozen." Of these "jade" (the white variety, not the green) and "frozen" are the most valuable. Indeed, so valuable is the latter that good specimens of it are said to fetch more than real jade itself. The industry finds

employment at the present time for some 2,000 miners and carvers. A great impetus was given to it by the opening of Wênchow to foreign trade. Previous to that event the chief purchasers of soapstone were officials and literary men, and the article most often carved was a stamp or seal. When it was discovered that foreigners admired the stone, articles were produced to meet what was supposed to be their taste. Such were landscapes in low or high relief, flower-vases, plates, card-trays, fruit-dishes, cups, teapots and pagodas. If left to his own devices the native carver proceeds first to examine his stone, much as a cameo cutter would do, to discover how best he can take advantage of its shape and shades of color. There is for this reason room for wide difference in artistic quality, apart altogether from the intrinsic value of the mineral, and carved pieces vary in price from a few cents to $10 and upwards. And among the more purely native articles produced are, besides the seals, writing material, as trays for pens, slabs for rubbing ink, and the like; flower-vases, square, round, or hexagonal; boxes for sealing vermilion, incense-boxes of all kinds, but chiefly having the character for "long life," in open-work, on the cover; small sandal-wood burners, flower-baskets, and balls, candlesticks, chess-men (or, as we should regard them, draughts), cups, bowls and lamps; idols, as the Star of Longevity, the Eight Genii, Goddess of Mercy; lions, monkeys and other animals. Less ambitious workmen content themselves with polishing the stone and cutting in relief certain common emblems, as the sun, moon, clouds, mist, the lute, chess-board, books, scrolls; or the characters for happiness, promotion, old age and posterity. It is said to be a peculiarity of the retail business that these goods are to be purchased more cheaply from house-to-house peddlers than at the mines. The reason given is that the excessive weight of the material makes the peddler glad to dispose of it at any price. But the facts may be quite otherwise, and the story an ingenious concoction in the interests of the peddlers. — *London Times.*

Mr. Gladstone on Architecture. — "I pass from it to the case of architecture, which is one of the fine arts associated with direct and immediate utility. One of the groups in this exhibition is connected with the building trade. Buildings are many, various and large. Every member of each of these trades may rise to be himself a builder, and if he has brains adequate to the work he may rise to be an architect. Why is it that architecture is placed among the fine arts? The question is worth asking and worth answering. It is because, although different from painting and sculpture in its close association with immediate utility, the results of that art are among the noblest and grandest things in the world. What is there in this country nobler than our cathedrals, which draw from America her most distinguished sons to make cathedral tours in England, going from one cathedral to another and feeding their hearts and souls upon all the great conceptions they suggest and upon the contemplation of those noble monuments of genius and devotion which they embody? A very distinguished writer, Mme. de Staël, in describing St. Peter's, uses an extraordinary expression, which sounds a little exaggerated, but in my opinion is not exaggeration. She says: 'The mind of an intelligent person cannot fail to receive from the interior of St. Peter's the suggestion that such a work cannot be merely human, but must be superhuman.' The road for the builders of this country to become architects is an open road. They want gifts which many of them possess. They want more diligence and fortitude, but it is an open road. Architecture is an art in which we may learn lessons from the past. There is this great peculiarity in the remains of early Christian architecture. In those remains beauty is not supplementary and occasional, but uniform and invariable. I am not now speaking of the works which were produced in the later Middle Ages, but of those works which present most of all the character of simplicity as their main characteristic. If you travel in Ireland, on no account fail to examine the Glendalough churches. I do not suppose there is one of those churches which is fifty feet long. You might build any one of them for £500. But every line of every one of these churches is instinct with beauty, which the rudest and most untutored can hardly fail to recognize. There is a circumstance in architecture which terrifies me, and that is the tendency which appears to prevail in modern domestic architecture. I am speaking of their exteriors, and I refer to their redundant ornamentation. There are a great number of new buildings in London — I hope I am not treading on any one's toes — with regard to which, if you look at them, you will find that the architect had either a horror or a dread of leaving bare a single square foot of wall, as if there were something indecent in leaving bare a square foot of wall. Why do you not wage a war against this excess of ornamentation? Excess of ornamentation is of all things the most hostile to a due appreciation of proportion, because it is in proportion to the perception of breadth and beauty and line and in the adjustment of lines to one another that the essence of the art lies, and in that you will find the hope of attaining high excellence in great works. I will go one step farther; I will mention to you the case of the exterior of Salisbury Cathedral. The man who wants to know what is beauty in stone, beauty not produced by ornamentation, should visit Salisbury, for there he will see less ornamentation on the exterior of the building than in any cathedral and, I believe, in a great many domestic houses in London. But if you want to see what can be done by simple beauty of outline, which is the foundation of all beauty, take a look at the exterior of Salisbury Cathedral. It is a model for all ages and for all countries." — *From a Speech at the National Workmen's Exhibition.*

Looking-glasses in Coffins. — One of the ancient customs connected with Swedish funerals was to place a small looking-glass in the coffin of an unmarried female, so that when the last trump sounds she might be able to arrange her tresses. It was the practice for Scandinavian maidens to wear their hair flowing loosely, while the matrons wore it bound about the head and generally covered with some form of cap. Hence the unmarried woman was imagined as awakening at the judgment day with more untidy locks than her wedded sisters and more in need of a glass. — *The Westminster Review.*

A Frenchman's Impression of Chicago Itself. — "The negro who made my bed invited me to occupy it. And as sleep was stealing over me I remember briefly the three weeks so quickly passed in Chicago, and I found that the World's Fair had left no sensible trace, no truly durable imprint on my memory. But that which did come to the surface, that which hastened to precipitate itself upon the condensation of my thought and memory, on the sensitive plate of my mind, was the vision of this redoubtable city, built upon a mud flat on the shore of a sombre, verdureless lake; it was the noisy, furious, impulsive, brutal life which there manœuvres its battalions — a life without soul and ideal, with its interminable dinners with their ranks of champagne bottles circulating among the evening coats, its drunkenness without gayety, its hypocritical luxury, its vulgar courtesies, its celebrations in which there is more flare than intelligence, and chiefly what struck me was the great press of business, that power of a modern Theomacus defying the impossible disturbing the horizon. Business! Business! Business! Is this not the real burden of the raven in Poe's poem? The next morning, raising the shade of my compartment, I saw behind the glass a smiling country unroll itself — a country composed of pretty fields, of picturesque mountains, of forests filled with flowering trees, of primitive farms, of radiant ponds peopled with wild birds. Before nature thus peaceful, in sight of these light mists, these mosses, these flowers opening in the sun, I forgot the frightful nightmare of the departure from Chicago, that Gordian city, so excessive, so satanic, whose life is too inclement for the singing, dreamy soul of the Latin races." — *Octave Uzanne in the Paris Figaro.*

A Photograph Seven Feet by Fifty Inches. — It is seven feet long and fifty inches high, and is a photograph of a relief map of the United States showing the oil-bearing districts. Photographers stand before the colored transparency in the north gallery of the Mines Building and declare it to be the biggest thing in the Exposition, and so it is, from their standpoint. J. K. Hillers of the United States Geological Survey is the man who made the wonderful photograph. The model relief map was started three years ago. It is made of wood veneers, one thirty-second of an inch thick, each thickness representing 100 feet of elevation. The map was built up of these veneers, and then carved in relief and a plaster cast taken. With the light striking it from the northwest it was photographed, the lights and shadows giving it a beautiful tone. When the negative was transferred to paper, the States, lakes, and names were drawn in, and a negative was taken from it twenty inches square. This negative was enlarged to the size of the transparency, 84 inches by 50 inches. No ordinary camera could do the work, so the photographer made a camera of a room twelve by fifteen feet in size. The room was blackened inside, and made light and even air tight. The shutter was placed in the window and the lens in the shutter. Mr. Hillers had three expert photograhers assisting him. The work was focussed on a ground-glass plate the same size as the photograph. This was done by three men holding the plate and moving it back and forth until the proper focus was secured. Then the sensitive plate was made ready. This was a piece of American plate-glass, three-eighths of an inch thick, made and polished for this particular picture. The photographers had to wait two months for proper conditions of light and temperature. A work of this nature had never before been attempted on such a large scale. Mr. Hillers was obliged to feel his way, for he did not know just how long the plate should be exposed. A test was first made with a small plate, and this gave him an approximate measure of time. With rare good fortune, the first exposure of the new plate was a success, and a beautiful photograph was secured. Then a specially arranged hose was turned against the big plate to wash away the chemicals. It took an hour to do this. After the toning process came the matter of varnish. This was the critical phase of the operation. The plate was laid on four rubber balls, one at each corner, and Photographer Hillers tilted it while an assistant poured on half a gallon of varnish. Success still remained with him, and the transparency was ready for its colors. It took four months from the beginning, when the first negative of the map was taken, to finish the transparency. It is valued at $5,000. — *Chicago Record.*

The Willow: Its Place in the Improvement Work on the Mississippi. — People who are unfamiliar with the Mississippi River are tempted to wonder when they first see it why so many thousands of acres of willows grow along its borders and islands and what they are good for. The United States Government, it is safe to say, would not be half as far along with the improvement of the Mississippi as it is if it had not had the humble and seemingly-useless willow. It is of no account for building, it cannot be construed as firewood by any but the most active imagination, and it is of no use in the arts, beyond the making of whistles, but when it comes to building a dam the engineers find nothing that fills the bill half as well as the humble willow. It lines the shores and can be easily reached from the barges whereon it is transported, and it is so soft that it is easily cut and handled. It is woven into a great, long, continuous mat. One end of this is anchored to the shore on one side of the chute that is to be dammed, and the process of weaving is thence carried on straight across the stretch of water on a peculiarly-shaped boat called a grasshopper. As fast as the mat is woven on the grasshopper it slides into the water at the lower end of the inclined weaving rack, and it is laden with rocks and carried straight to the botton, and this is continued till the opposite shore is reached. The mat is then covered to the proper depth, 12 to 15 inches, with rock, and then another mat, made in the same way, is woven and laid down on top of the first, and similarly weighted down, and this work is continued till the dam has risen as high as it is intended to stand; the finishing being always a heavy coating of rock that covers the willow and all. The willow, always covered with water and the mud that inevitably lodges among the rocks of the dam, is kept sealed air-tight, and of course does not decay. It binds the rocks together and prevents the dam being shoved out of place by ice or disturbed by the pressure of the current at high water. It is good for no other purpose save to hold a shore that is washing away with its roots, and for dam construction it is superlatively the thing. — *Davenport (Iowa) Democrat.*

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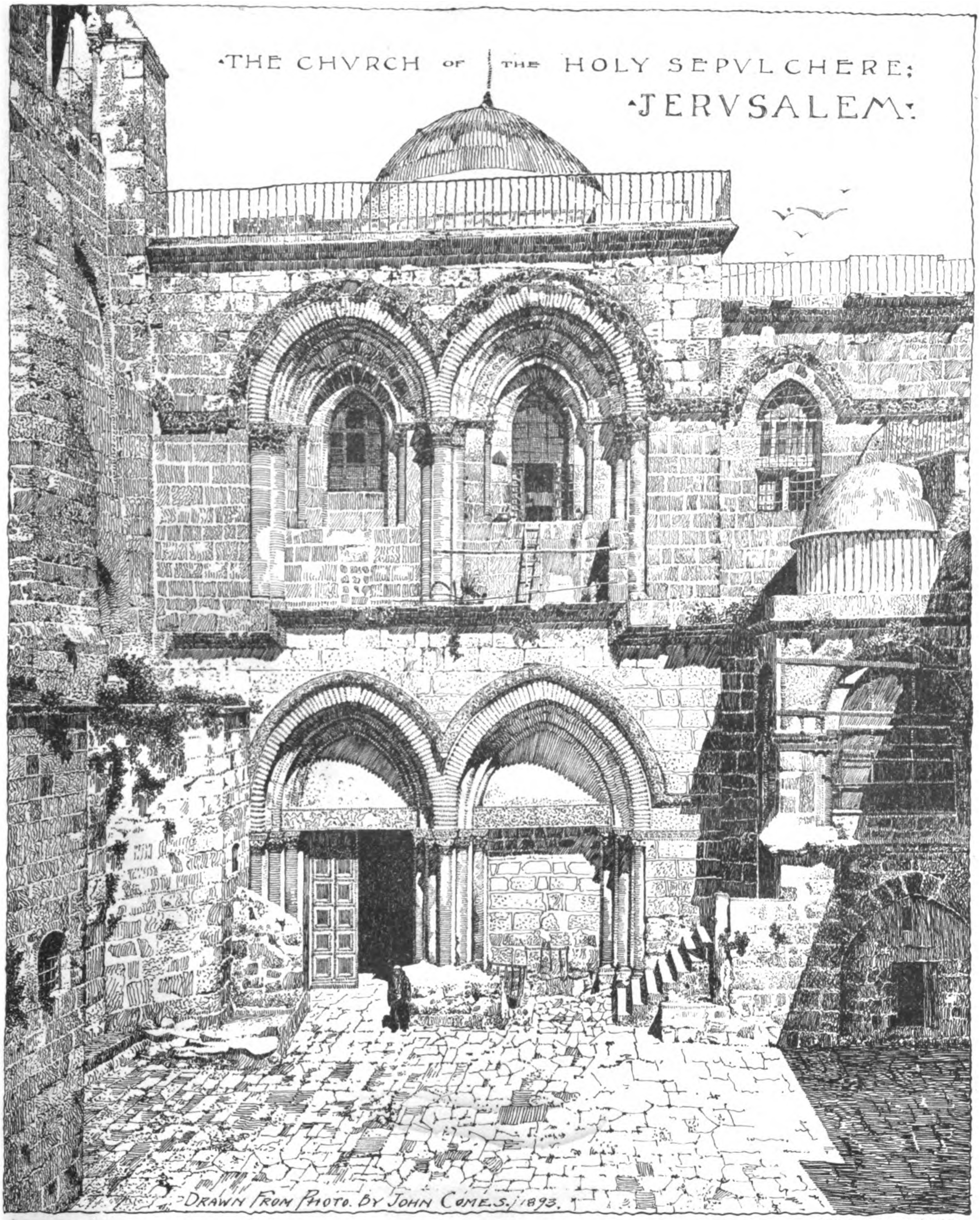
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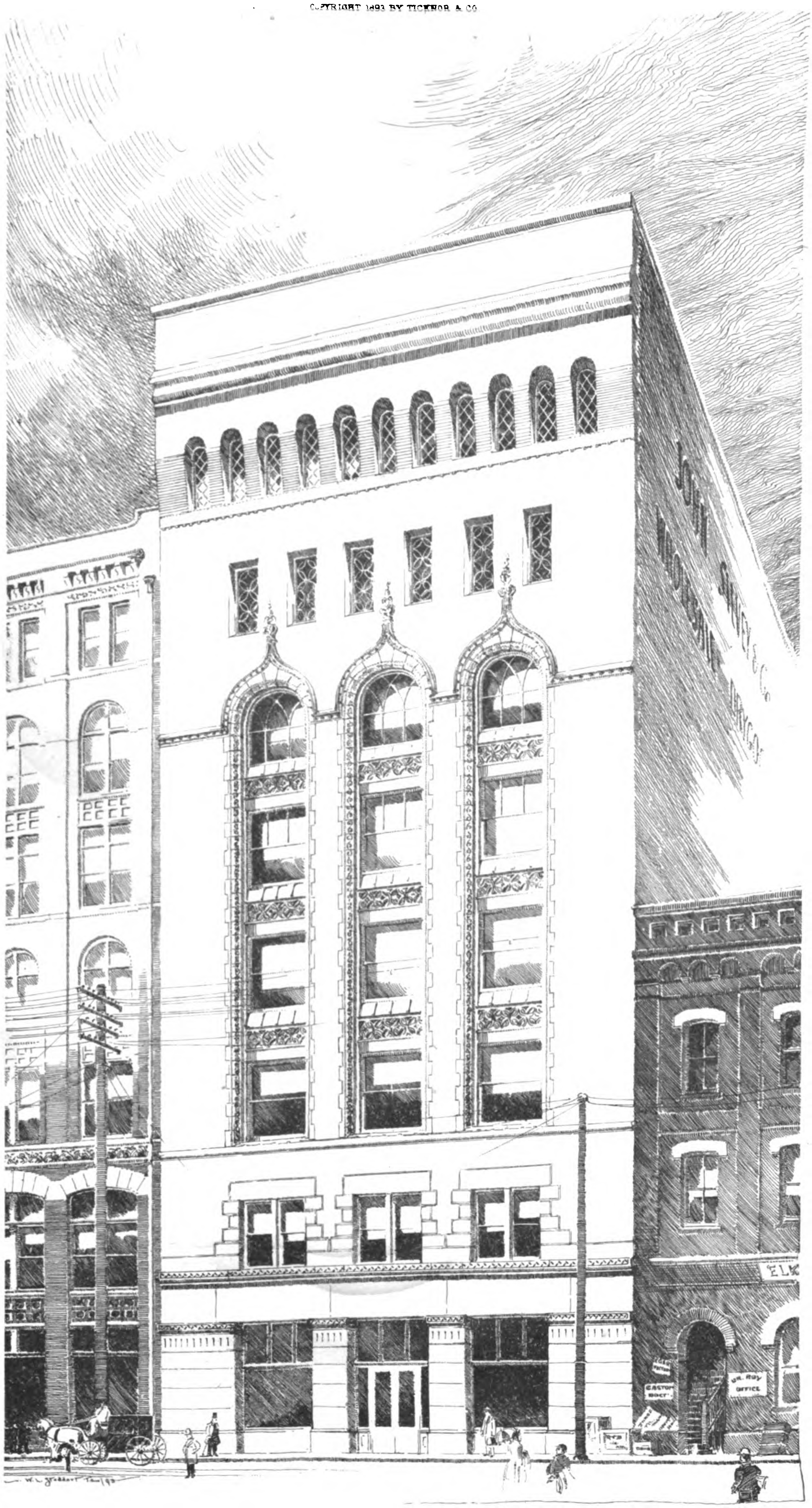

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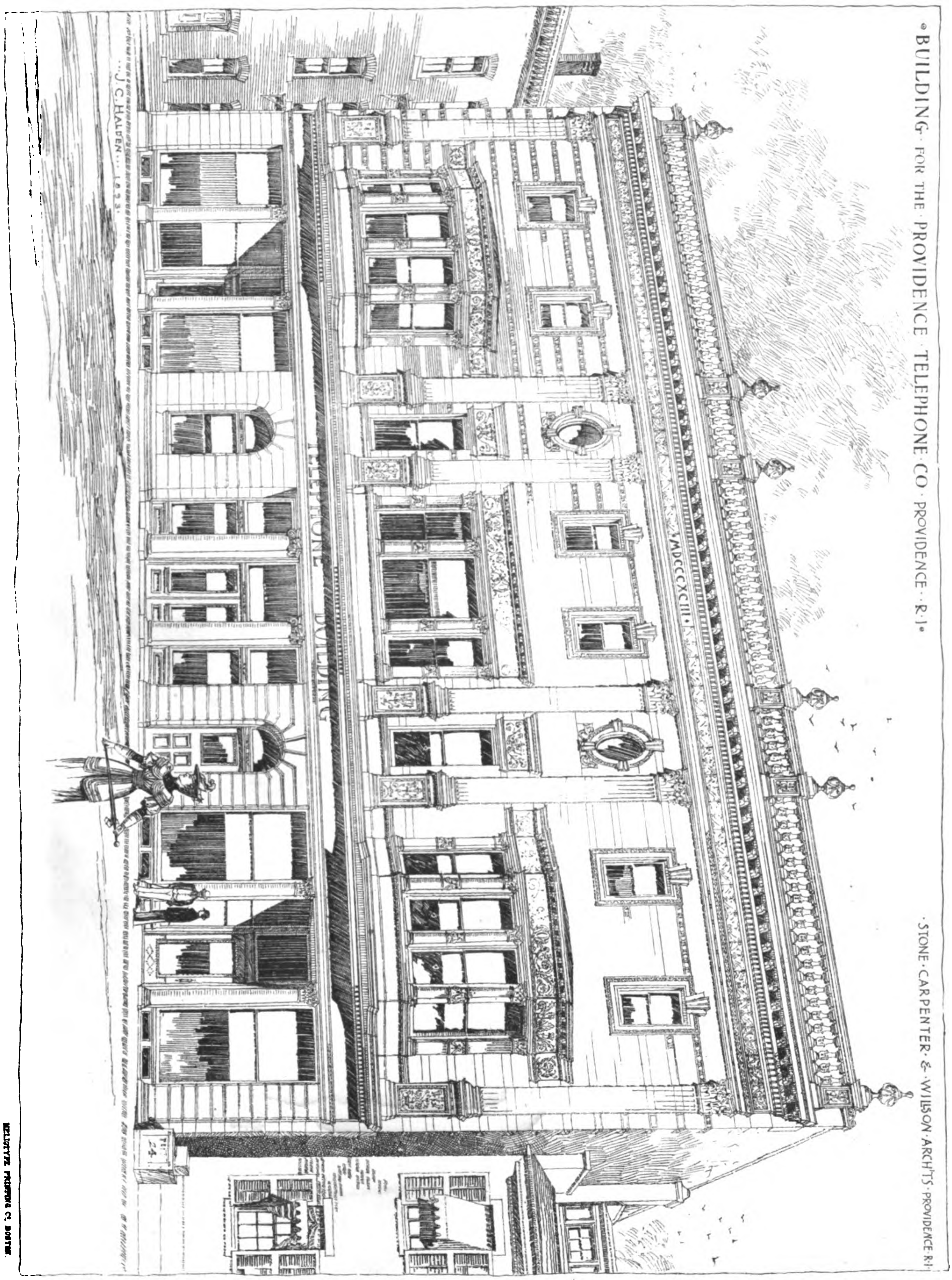
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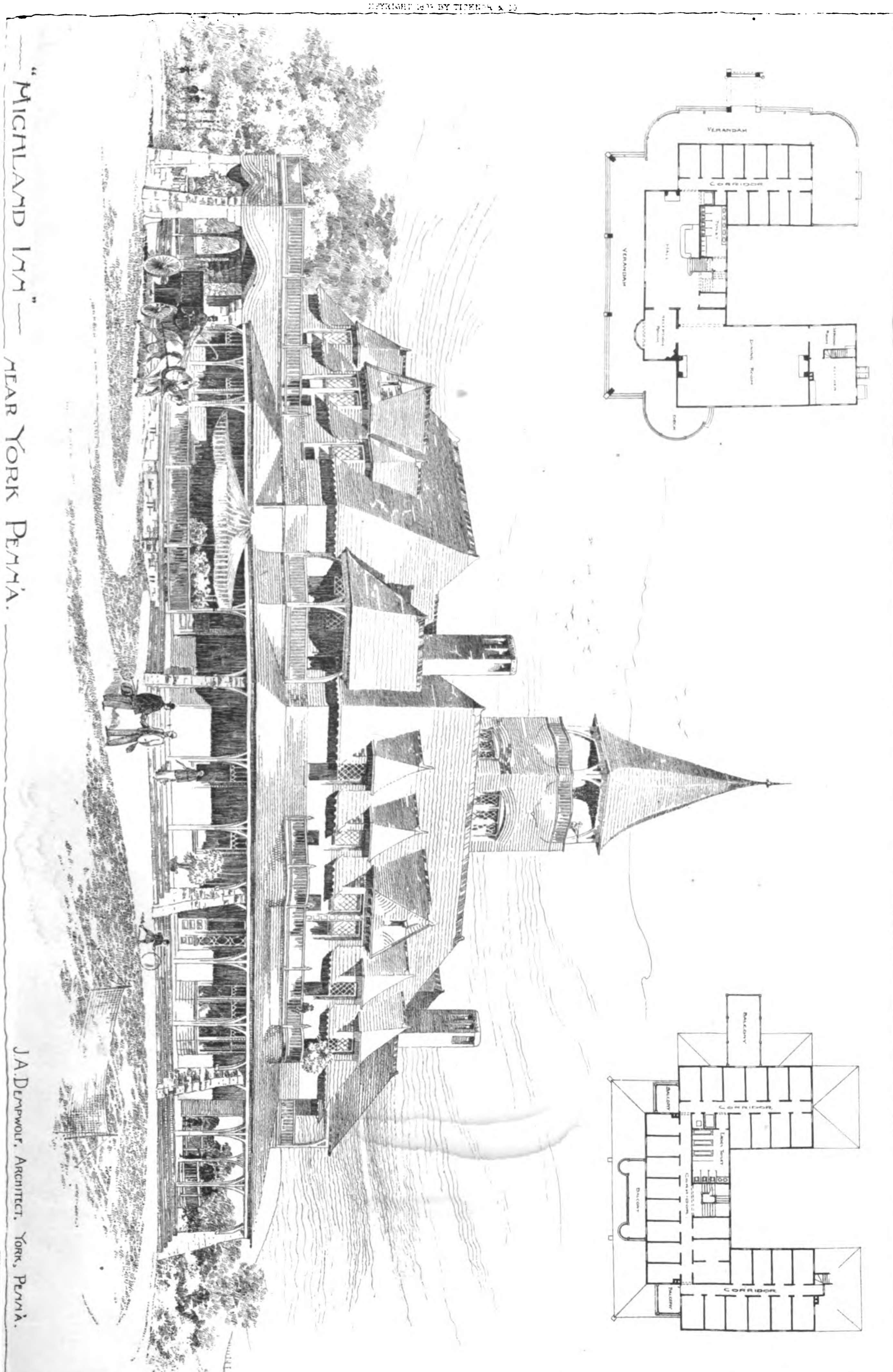
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CONTENTS

WE must confess that we never hear "Labor Day" or "Labor's Holiday" mentioned without a feeling of contempt and disgust for the impudent demagogism on one side, and cowardly servility on the other, which have brought the descendants of those who prepared and defended the Declaration of Independence down to the embodiment in legislation of the idea that, instead of all men being born free and equal, there are two sorts of men in this Republic, one consisting of the members of certain organizations, and the other including the miscellaneous persons who do not belong to these organizations, and that those who do belong to them are entitled to favor and recognition from the Government which is not accorded to other people. In a community whose whole public system is founded upon the idea that there should be no class legislation, it is certainly curious to find, of late years, statute after statute enacted at the demand of the crafty and ambitious foreigners who control the forces of "organized labor." For several years, "organized labor" has, or would have had, but for internal squabbles, things pretty much its own way in the legislatures, but just now, circumstances which neither legislatures nor walking-delegates can control have given a very large number of citizens more leisure than usual for thinking, and there are indications that a good many of them are reflecting whether, after all, they might not be as well off in the simple capacity of "free and equal" citizens of the Republic as they are now in that of abject slaves of a foreign tyranny which dictates to them when, how, with whom and at what price they shall work, which prevents them from teaching their own business to their own children, and which forces them to sit idle and see their families suffer, when work is plenty, for the sake of "sympathizing" with some other people, of whom they never heard, and whose relations to them consists solely in a concerted scheme of their respective leaders for their private advantage.

THERE is no doubt that, with the stagnation and uncertainty of nearly every kind of business, salaries, whether paid by the year, month or week, and whether amounting to ten or ten hundred dollars a week, must be reduced, for the simple reason that there will be several applicants for nearly every employment, and the employer, whose salary, if he is in his turn employed, or whose income, if he depends on the custom of salaried people, has been also reduced, will hire the one who will give him the service he wants for the least money. Under these circumstances, the fetters of trades-unionism, by which men who wish to work must lie still and see others, who are not bound by rules or oaths as to what price they will take for their labor, get the employment they want, will seem oppressive, as they never have before, and, although the tyrants will probably make a savage struggle to keep their control where they think they have any chance of doing so, there is some prospect that "organized labor" will for a time fall into the background, and that ordinary citizens will be given something like a fair chance in earning and regulating their living. Meanwhile, it will be interesting to call attention again to the matter which is most vital of all in considering the question of wages, but which is totally ignored, much to the advantage of the labor tyrants, in nearly all published statistics; that is, the total annual income of men in the organized trades. We are constantly told that the organization of labor has advanced wages, and are confronted with comparative tables of the wages per day demanded by union workmen ten or twenty years ago and now; but we seldom find any reference to the fact that, although the rate of wages has advanced in the organized trades, the proportion of employed to unemployed time has, in this country, fallen off, so that the average union carpenter or mason, in the course of a year, earns less now than he formerly did, while, as other "organized" people have imitated him in demanding higher wages for their work, he has to pay more for his house, more for his shoes and more for everything else that he consumes, into the cost of which "organized labor" enters, and has less money to do it with. It will be remembered that, according to the official statistics collected by the State of Wisconsin, the average income of carpenters in the great and rapidly-growing city of Milwaukee was, two years ago, about five hundred dollars a year. Wages were nominally high, and the most savage penalties attended any attempt on the part of a union carpenter to take less; but there was little demand for such high-priced labor, and the carpenter who could eke out his living by cultivating a garden-patch or going off lumbering in winter considered himself fortunate. Meanwhile, supposing the cost of labor in the house occupied by the Milwaukee carpenter to have been half the entire cost, and the artificial standard of wages under which it was built to have been twenty-five per cent above the natural one fixed by the law of supply and demand, he, with a yearly income about equal to that of an Italian day-laborer, is obliged to pay one-eighth more rent than he would have had to pay if the unions had not artificially increased the cost of his house. It does not require a great mind to see that the Milwaukee carpenter would be much better off, at lower wages, if he could be employed all the time, and it is equally obvious that if the cost of houses were not artificially enhanced by the union leaders, more people could afford to have new ones, and there would be more of them built, so that the carpenter's labor would be in more constant demand, and his yearly income larger, while his house-rent and many other expenses would be less. Certainly, a long argument ought not to be necessary to convince a man that, to earn seven hundred and fifty dollars a year, at two dollars and a half a day, and have only four hundred and fifty to pay out for expenses, is more profitable than to earn five hundred dollars a year by working occasionally at three dollars a day, and have to pay out the whole five hundred for expenses; yet any person in this country who ventures to suggest that the reduction of the artificial standard of wages could be advantageous to all persons concerned is denounced as an enemy of the human race; and the union tariffs are held up to the admiration of mankind as an evidence of the prosperity of the country and the blessed condition of American workmen at the very time that the same workmen are emigrating to Germany, Holland, France and England, finding that, in many cases, they can earn actually more money in a year there than here, while the cost of living there is a fraction of what it is in the United States.

A BRIDGE is in process of erection in Chicago on what is by no means a new plan, although we believe that it has not been applied before in this country. The bridge is to span the Chicago River, and is designed on what is known as the "lift" principle, by which, instead of turning half around, or receding in some other way at its original level, to give passage to vessels, as in ordinary draw-spans, the middle part of the bridge rises vertically to a height sufficient to allow vessels to pass underneath. Theoretically, this is a better

plan than the old one, as the ends of the draw-span are firmly held, instead of overhanging vacancy, and the lifting can be effected more rapidly than turning. Practically, however, we suppose that such bridges are exposed to all the accidents that beset elevators, and these are many. In the Chicago bridge, which has a span of one hundred feet, the normal height above the water is fifteen feet, which gives room enough for tugs to pass under; but, to admit the passage of vessels with high masts, the draw-span can be raised one hundred and forty feet higher, giving room for the loftiest masts. For craft with short masts, the bridge need not be raised so high, which will, apparently, economize the time and power needed for the operation. The towers are of steel framing, and the whole affair, which appears to be of the most substantial design, will be very interesting to scientific visitors.

AMONG the numerous plans for laying out the new quarter of Munich is one by Professor Hauberisser, one of the best known architects in Germany, which presents some interesting points. While the great thoroughfares of the present city are extended into the new region, most of the new streets are curved, in a manner which would give picturesque effects, but would, we think, be terribly confusing to a stranger. Unfortunately, Professor Hauberisser only sent a single general plan, at a small scale, instead of the thirty-one sheets of drawings, at various scales, required by the programme, so that his design was excluded from the award of prizes, although it received honorable mention from the judges, and was purchased by the city. The *Deutsche Bauzeitung*, which has devoted much space to an admirable discussion of the various designs, prefers, however, that of Professor Henrici, which we have already described. It is true that the Henrici design embodies so many novel and startling theories of street-planning as to excite a certain alarm in the average mind, but that it would produce a wonderfully picturesque effect cannot be denied, and the *Deutsche Bauzeitung*, which, notwithstanding its high rank as a scientific and technical journal, is thoroughly artistic in its sympathies, has done much by its discussion of Professor Henrici's innovations, to prepare the public mind for seeing his plan carried into execution, as we sincerely hope it may be. Professor Henrici himself seems to have been quite aware of the astonishment and suspicion with which his views would be received, for he accompanied his elaborate and beautiful set of competition drawings with a "description" which, instead of the usual bald and tedious memorandum, consisted of an imaginary dialogue between "Realist," the name used as his motto, and "*Stimme der Zeit*," or, as we might translate it, the common idea, representing the preconceived notions which have, ever since the time of Baron Haussman, ruled over the laying out of new streets.

AS shown in this dialogue, the starting-point of Henrici's plan was the beautiful group of irregular and picturesque streets which radiates from the Marienplatz, the business centre of the city. It was evident that this central point must be more and more frequented as the city increased in population, and that the increasing traffic must be accommodated; but, instead of spoiling the picturesqueness of the present principal streets, which are already tolerably wide, by widening them still farther, it seemed to him best to relieve them by widening and connecting certain insignificant streets and alleys which run nearly parallel with them, and at a short distance. Thus, instead of widening, at great expense, the Thal, the Kaufingerstrasse and the Neuhauserstrasse, which run east and west from the Marienplatz, and on which stand some of the finest buildings in the town, he would widen and connect the Frauenstrasse, the Rosenthal, the Färbergraben, the Althammereck and the Herzogspitalstrasse, which run in the same direction, one or two hundred yards away. A new north and south street, nearly parallel to the present Theatiner and Surdlingerstrasse, would be managed in the same way; and the removal of the old Schranneu-Halle would open a wide street, or rather avenue, planted with trees, directly from the Thal, near the Marienplatz, to the gate of the great park of the Theresienwiese. The idea of relieving the traffic of principal streets, not by widening them, but by forming new ones, nearly parallel with them, out of the neglected slums and alleys which usually exist at a little distance from them, is practically new, but it cannot be denied that it has great advantages. For improving the outlying regions of the city, Professor Henrici divides the territory into seven parts, corresponding with the present natural divisions. Reasoning that these districts will continue to be, as they are now, and as similar districts are in all towns, to a certain extent distinct, carrying on an active local traffic, and requiring ready communication with the central part of the city, but not exchanging much traffic directly with each other, he treats each district separately, laying out its streets to suit local topography and other peculiarities, arranging ample communication with the general centre, and sufficient, but not excessive, communication with the neighboring districts. Although this idea is also new to the rule-and-compass school of street-designers, it is supported by experience, which shows that the tendency of traffic between points in a suburban ring is to pass from one point of the circumference to the centre, and thence to another part of the circumference, in preference to taking the shorter route around the circumference. In laying-out all his streets, Professor Henrici has, apparently, avoided nearly all the favorite practises of the ordinary street-planner. The starlike points where half-a-dozen principal streets intersect, which ornament so many maps, are absent from his. As "Realist" says, the concentration of the traffic of several streets upon a main avenue obstructs that avenue, and should be avoided. As, however, it is advantageous to have theatres, music-halls, schools, churches and other places of public resort placed at the focus of several radiating lines of streets, such foci should be provided, but they should be kept a little away from the great avenues, where they will be conveniently accessible, but will not form an obstruction. It would take much too long to mention all the novel ideas which "Realist" propounds and embodies in his plan, but one or two are well worth remembering. One of these is that streets which are slightly curved are less liable to stoppages and blockades, with a given amount of traffic, than straight ones; and another, which seems to have excited a certain amount of disapprobation, is that the present system of laying-out streets and regulating street-lines is arranged altogether too much after the dictation of street-railway directors. The principles of street-railway traffic, as mathematically deduced from certain postulates, are, Professor Henrici thinks, pure assumptions, which leave out of account the most important factor in the problem, namely, the people, who have something else to do besides mere travelling to and fro; yet so accustomed has the public become to the old system of improving towns by driving straight avenues in all directions through them, that he despairs of ever making it understood how much more beauty, comfort and convenience can be obtained by a different system.

THE annual competition for the Prize of Rome took place at the Paris School of Fine Arts last month, with ten competitors, and the grand prize was awarded to M. Chaussemiche, a pupil of André and Laloux, who took the "second second" grand prize in 1891. The "first second" grand prize was awarded to M. Paul Dusart, also a pupil of André and Laloux, and the "second second" prize to M. Recoura, pupil of M. Pascal. The subject of the competition was a "Palace for the Learned Societies." It was required to provide accommodations for eighty societies, of unequal importance, divided into two groups, one comprising the societies interested in physical science, and the other those cultivating literature, history and the arts; and one of the conditions was that the societies should have accommodations independent of each other, yet communicating in such a way as to allow various societies to join with or assist each other on occasion. It would not be easy to devise a more difficult problem, but the unrivalled skill in planning which the School of Fine Arts manages to impart to its pupils makes light of such difficulties.

THERE is rather an interesting novelty about the Trenton Battle Monument, which will soon be ready for unveiling. The monument consists of a colossal statue of Washington, standing on top of a column, but the peculiarity of the statue is that while it represents Washington, with the right arm extended, in the act of ordering Captain Alexander Hamilton's battery of New York artillery into action, it stands over the very spot where Washington gave that order, as if he had been at the moment turned into bronze. The spot is said to be well identified, the details of the battle being familiar. The figure was modelled by W. R. O'Donovan, and cast at the National Fine Art Foundry, in New York.

OFFICE-HELP FOR ARCHITECTS.[1]—XVIII.

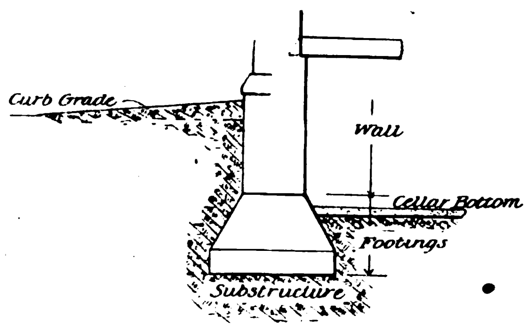

Fig. 74.

CHAPTER VII. — FOUNDATIONS.

§ 250. Definitions: — In what follows, the several parts of the walls or piers below the line of the curb opposite centre of building, in the case of a city building, or the portions below the plane of the water-table will be called "foundations" and divided into "the wall," "the footings" and "the substructure." (Fig. 74.)

§ 251. Weights: — To properly proportion a foundation, it is necessary to know approximately the weights imposed by the building on each lineal foot of wall; for this purpose Table XXVII is given.

Assumptions: — Weights are from top of footings.

Height of stories 12′ 6″, finished floor to finished floor.

Walls: — Brick, at 120 pounds per cubic foot. Sizes conforming to New York Building Laws for walls.

TO DETERMINE LOAD ON FOOTINGS FROM FLOOR-LOADS.

Up to five stories:

$$\text{Total per foot in tons} = \frac{\text{Number of stories} \times L \times l}{4{,}000} \qquad (49)$$

For five to seven stories:

$$\text{Total per foot in tons} = \frac{\text{Number of stories} \times L \times l}{5{,}000} \qquad (50)$$

Above seven stories:

$$\text{Total per foot in tons} = \frac{\text{Number of stories} \times L \times l}{6{,}000} \qquad (51)$$

In a building up to five stories, all floors may be loaded with very near the maximum live load at times. Above five stories, this becomes increasingly improbable. In the West, a reduction is made of 5% per story in the live load for tall buildings with good results. This is probably because any soil will resist for a short time an overload that would cause sinkage into it, if left for a considerable time.

$$\left\{ \begin{array}{l} \text{Weight of wall (Table XXVII)} + \\ \text{weight due to floors (Table XXVIII)} \end{array} \right\} = \begin{array}{l} L \text{ on footings} \\ \text{per lineal foot.} \end{array} \qquad (52)$$

$$L \text{ on substructure} = \text{Wall} + \text{Floor} + \text{Footings.} \qquad (53)$$

Wind loads should not be figured as adding to the loads on the footings.

TABLE XXVII.

WEIGHT OF BRICK WALLS IN TONS PER LINEAL FOOT.

			BRICK AND FRAME.		FIREPROOF.				WAREHOUSES.		
					DWELLINGS.		OFFICE-BUILDINGS.				
Stories.	Height.	Frame.	Bearing.	Not B.	Bearing.	Not B.	Bearing.	Not B.	Bearing.	Not B.	Skeleton.
16	200.0				27.20	23.20	30.00	26.40	30.00	26.00	18.00
15	187.5				24.45	20.70	27.25	23.50	27.25	23.50	16.50
14	175.0				21.95	18.45	24.50	21.00	24.50	21.00	15.00
13	162.5				19.45	16.00	22.00	18.75	22.00	18.75	13.50
12	150.0				17.20	14.20	19.50	16.50	19.50	16.50	12.00
11	137.5				14.95	12.20	17.25	14.50	17.25	14.50	10.75
10	125.0				12.95	10.70	15.00	12.50	15.00	12.50	9.50
9	112.5				10.95	8.95	13.00	11.75	13.00	11.75	8.25
8	100.0				10.20	8.70	11.00	9.00	11.00	9.00	7.00
7	87.5[1]		6.70	5.8	6.70	6.70	8.40	6.65	8.40	6.65	6.00
6	75.0		5.00	5.00	5.00	5.00	6.50	5.00	6.50	5.00	5.00
5	62.5		3.96	3.96	3.96	3.96	4.40	3.75	4.40	3.75	4.00
4	50.0		3.00	3.00	3.00	3.00	3.50	3.00	3.50	3.00	3.00
3	37.5	0.21	1.72	1.50	1.72	1.50	2.25	2.25	2.25	2.25	2.25
2	25.0	0.14	0.56	0.56	0.56	0.56	1.50	1.50	1.50	1.50	1.50
1	12.5	0.07	0.48	0.48	0.48	0.48	0.75	0.75	0.75	0.75	0.75

[1] In New York the limit of height of a wall for non-fireproof construction is 85′ 0″. For a change in thickness of wall of 4″, multiply by 0.02 to obtain tons per lineal foot.

TABLE XXVIII.

FLOOR LOADS, DEAD AND LIVE, PER SQUARE FOOT.

For ordinary frame dwellings, churches, etc.	100 lbs.
" " brick " not fireproof	110 "
" " " office-buildings, not fireproof	125 "
" " " " " fireproof	175 "
" " " buildings for light manufacturing purposes, not fireproof	225 "
" " " buildings for light manufacturing purposes, fireproof, armories, gymnasiums and stores	275 "
" " " warehouses, not fireproof	300 "
" " " " "	400 "

[1] By George Hill, Consulting Engineer. Continued from No. 923, page 141.

ABBREVIATIONS AND SYMBOLS.

$=$ equal to.
$\parallel$ parallel to.
$\div$ divided by.
$\times$ multiplied by.
$+$ added to.
a^2 a multiplied by itself.
$a > b$: — a greater than b.
$a < b$: — a less than b.
$\frac{a}{b}$: — a divided by b.
$\therefore$ therefore.
$\square'$ square feet.
$\square''$ square inches.
8# read 8 pounds per lineal foot.
[channel bar.
I I-beam.
T T-iron.
L angle iron.
⊥ deck beam.
● round section.

SECTION I. — SOILS:

§ 252. Remarks: — All soils on which it is intended to erect a structure should be studied and explored to a depth which will be sufficient, in the character of material passed through, to sustain a load at least 25% greater than that contemplated, or until some incompressible stratum is reached.

Procedure as follows:

First. — Ascertain, as far as possible, the original topographical features and original level of the ground at and near the site.

Second. — Ascertain what changes have taken place in the way of levelling, filling, draining, etc.

1 ton $=$ 2,000 pounds as this is the conventional ton, the legal ton is 2,240 pounds, but is rarely used.
$l =$ the length between supports of any beam or girder or height of any column, always in feet.
$b =$ breadth of any beam or girder, always in inches.
$d =$ depth of any beam or girder, or the least transverse dimension of any column, always in inches.
$L =$ total load uniformly distributed coming on any piece in pounds.
$L^{\square'} =$ " " " " per square foot in pounds.
$W =$ concentrated load on any piece in pounds.
$s =$ span of any arch or truss between centres of end pins in feet, or spread of footing courses.
$A =$ area of any section in square inches.
$M =$ maximum bending-moment in inch pounds.
$n =$ distance of centre of gravity of section from either top or bottom edge in inches.
$I =$ moment of inertia, neutral axis through centre of gravity.
$R =$ moment of resistance of section.
$r =$ radius of gyration, in inches.
$Sc =$ safe compressive strain in pounds per square inch.
$St =$ " tensile " " " " " "
$Ss =$ " shearing " " " " " "
$S =$ strain per square inch in extreme fibre.
$P_e =$ upward reaction of support at left-hand end of beam.
$P_f =$ " " " " " right " " " "
$e =$ distance of centre of gravity of load from left hand of beam.
$f =$ " " " " " " " " right " " "

Third.— Have tests made by some fully competent engineer to ascertain the exact character of the soil.

§ 253. Testing: *When* $L =$ *or* < 6 *tons:*— Have test-pits dug at intervals of 10′ 0″ around the foundations to proposed depth of footings, then sink holes with $1\frac{1}{4}''$ auger to an additional depth of 10′ 0″, one in each pit.

In clay or compact earth, the hole will stay; in sand or gravel, drive in a $1\frac{1}{2}''$ pipe, using a wooden maul, keeping the pipe always in advance of the auger. The auger will bring up samples of the soil. In case the geology of the section has been studied, an examination of the outcrops of the strata will give a good indication of the soil, which should be verified with at least one boring when, if this agrees with the diagnosis, the remaining borings may be omitted.

When $L = 6$ *to* 15 *tons:*— Proceed as above, but make all of the borings, unless gravel, sand or rock is known to exist for a depth of at least 30′ 0″. If the soil is homogeneous clay, or soft earth, make the borings at least 25′ 0″ deep, and if the soil gets softer as the depth increases, make the borings at least 35′ 0″ deep.

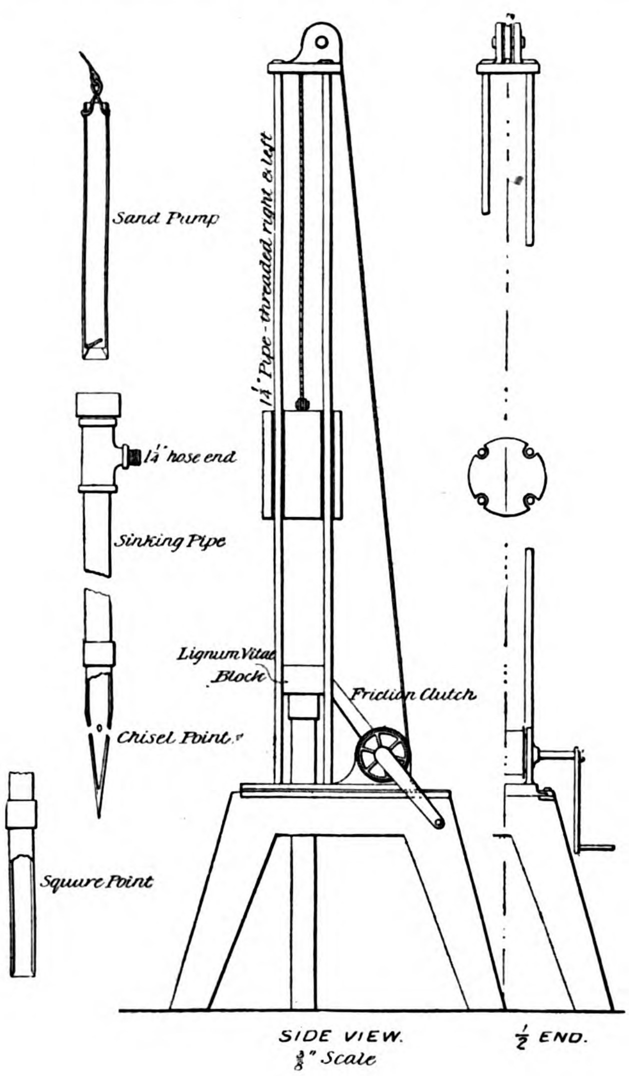

Fig. 75.

When $L > 15$ *tons:*— Make the borings at least 60′ 0″ deep, or to rock, spacing them so as to be equidistant, and one for each 900 square feet of area covered by the building.

Should any bore fail to reach the average depth of the others, additional ones should be driven around it, until the average depth is reached; in this way the obstacle will be outlined. If they should show a lack of uniformity, additional bores must be made.

§ 254. Methods:— For all test bores up to 30′ 0″ in ordinary soils, a $1\frac{1}{4}''$ auger mounted on 1″ gas-pipe with several 5′ 0″ lengths, and one 1′ 0″ long with an eye to insert the handles, three lengths of $1\frac{1}{2}''$ gas-pipe 12′ 0″ long, with maul, couplings and tongs for jointing, are all that are necessary.

For test bores under other conditions use:

(*a*) A light pile-driving frame as shown on Figure 75, with the runs arranged to slide back. (Type devised by Prof. Charles B. Brush.) Lengths of 3″ pipe, 5′ 0″, 10′ 0″, and 12′ 0″ long, with couplings, tongs and a cap to screw on.

(*b*) An oak or lignum vitæ block 8″ diameter, 12″ long, strapped with iron.

(*c*) A $1\frac{1}{2}''$ auger, with $1\frac{1}{4}''$ jointing rods 5′ 0″ and 10′ 0″ long. Several chisel-shaped points to use in place of the auger in going through hard material, some perforated and some solid.

(*d*) A sand pump, *i. e.*, a 5′ 0″ length of $1\frac{1}{2}''$ pipe with a ring in top end, and the bottom chisel-shaped, with an ordinary clack-valve in it. (Fig. 75.)

(*e*) A 1″ force-pump with 20′ 0″ of $1\frac{1}{2}''$ suction-hose, and 60′ 0″ of 1″ delivery-hose attached to a coupling at the end of a $1\frac{1}{2}''$ pipe. On the end of the pipe the various points are fitted.

The operation is as follows: The pile-driver is mounted over the place it is desired to test, and one of the shorter lengths of 3″ pipe driven in, then the auger is started down to a depth of two or three feet below the bottom of the 3″ pipe, and the samples brought up and saved. Then the pipe is lengthened, driven down again, and the auger used again, and the cycle repeated, until the auger can be used no more; then the chisel on the end of the $1\frac{1}{2}''$ pipe is put on and a stream of water started down the pipe. This soon fills the hole and muddy water flows out; if this is caught in a pail, the sediment will show the character of the soil. Samples should be taken constantly, and at every change in character a portion should be placed in a wooden box 3′ 0″ long, 4″ wide and 1″ deep, divided by longitudinal partitions into a number of parts, with transverse divisions placed at each point where the samples change character, and the depth of the change-point below the surface noted on the box. The distinguishing number or letter of the bore should be placed at the top of the compartment.

The box should be made to some scale and the samples put in to that scale, so that their relations to one another can be seen at a glance.

A note-book should also be kept, giving minutely the character of the soils passed through, veins of water, rate of progress, etc., on one page, and on the other a sketch showing a vertical section. The rate of progress should be particularly noted, as it indicates in a general way the hardness and the amount of water in the soil.

Bores of 20′ 0″ or over, should always be made by experienced men, and the results judged by one familiar with the methods employed, as it gives more reliable results, and is much more economical.

Should rock be encountered near the surface, of at all doubtful character, or should there be limestone in the vicinity abounding in fissures, the rock should be explored with a diamond or other drill for at least 30′ 0″ in depth, and in at least two places, so as to eliminate all doubt as to its soundness.

The safe plan would be to consult a geologist to determine whether or not there are probably any fissures of 2′ 0″ or more in size, and their probable general direction.

Soft Soils:— These should be tested by driving long spruce piles with a 1,200-pound hammer, until their penetration is $< 3''$ under a 20′ 0″ fall. Rate of penetration and behavior should be carefully noted. (See § 270.)

§ 255. Bearing Value: *Soils, Data:*— Value given per square foot is for a minimum area covered of 20 square feet. Results are from various sources, many have been tested by the writer, and all are believed to be safe.

TABLE XXIX.

BEARING-VALUE OF VARIOUS SOILS, *B*.

Character of soil.	Safe loads per square foot in tons.
Ordinary earth (red sandstone)	2
" " (primary)	2
" dry clay (tertiary)	3
" wet " (not homogeneous)	$1\frac{1}{2}$
" " "	2
" gravel and small boulders (tertiary)	5
" sand, gravel and small boulders, water-packed	5
" " water-packed	5
" " very fine and micaceous	$3\frac{1}{2}$
Old fills of doubtful character	$\frac{3}{4}$
Mud	$\frac{1}{2}$
Silt	$\frac{1}{4}$

Rock, will bear all that the walls will.

Piles, Data: — Bearing-value based on the minimum length of spruce pile and average penetration as given for last five blows of a 1,200-pound hammer falling 15′ 0″.

Piles left sound. Dimensions as follows:

TABLE XXX.

DIMENSIONS OF SPRUCE PILES.

Length.	Diameter of butt.	Diameter of point.	Remarks.
20′ 0″	8″	5″	Sizes for oak may be ½″ smaller; for all other timber, may be same as spruce.
25′ 0″	8½″	5½″	
30′ 0″	9″	6″	
35′ 0″	10″	6″	
40′ 0″	11″	6″	
45′ 0″	12″	6″	
50′ 0″	13″	7″	
55′ 0″	14″	7″	
60′ 0″	15″	7″	

Note: Butts to be cut square, points cut on four sides, leaving the point 1½″ square, and 8″ to 12″ long. For very soft soils, make as much thicker as they can be procured.

TABLE XXXI.

BEARING-VALUE OF PILES.

Soil.	Pile lengths.	Penetration.	Load tons.
Silt	40′	6″	5
Mud	30′	2″	8
Soft earth with boulders or logs	30′	1½″	9
Moderately firm earth or clay, with boulders or logs	30′	1″	12
Soft earth or clay	30′	1″	12
Quicksand	30′	½″	17
Firm earth	30′	½″	17
" " into gravel	20′	½″	17
" " " " or rock	20′	0″	20
" homogeneous earth	30′	½″	20
Sand	20′	0″	20
Gravel	15′	0″	20

§ 256. **Treatment:** *Soils, Earths:* — Should have excavation carried below frost line. Excavation should be carefully levelled and rammed with a wood ram. Masonwork should follow the ramming closely. Should be drained (See Drainage, Chapter XII).

Clay: — When dry, should be treated as earth; when wet, lay ½″ × 4″ boards down, and ram on them. Drain by laying drains 2′ 0″ away from, and 1′ 6″ below bottom of footings, for weight up to 10 tons; beyond that, place the drains farther away and deeper. Great care must be exercised to make the soil absolutely dry at all times, and to provide means to carry off the water freely. If drainage is impossible, fill with sand or gravel in layers and ram. If for a heavy, important structure, consult an engineer of experience.

Sand: — If dry, level off, spread 2″ of concrete over, well rammed, and immediately start masonry. Sloping beds of clay, especially when some little distance from the top of the slope, are dangerous as the building is always liable to slip down the slope.

If footings are above the level of the sewer, or above the average depth, so as to make it possible for the footings to be undermined, protect them by driving 2″ × 10″ × 8′ 0″ creosoted sheet-piling on both sides of the footings.

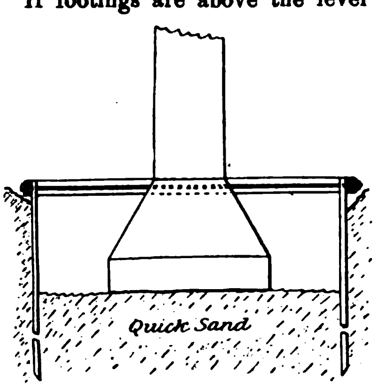

Fig. 76.

If the sand is wet, and the footings so deep as to be free from all danger of undermining, proceed as for dry sand; otherwise, sheet-pile as above.

Gravel: — Level off, and spread 2″ of concrete over to start masonry on.

Quick-Sand: — Pile or drive in the longest sheet-piles practicable on both sides of footings, put wales 8″ × 8″ along outside, and hold together with 1″ bolts 4′ 0″, *c* to *c*, with large washers (See Fig. 76). Spread 1′ 0″ of concrete over to hold sand in place, then start footings. Until weight comes on, the wales will need to be shoved apart.

Fills: — For light buildings consolidate, use a very wide spread to footings. For medium and heavy buildings, pile or use a crib supporting the walls on steel shapes or girders, and connecting opposite walls by means of I-beams of sufficient strength to act in manner similar to a floor, distributing the entire weight of the building over the entire area of the lot occupied. The total weight of the building divided by the area gives the load per square foot, from which the beams must be proportioned, and the weight per lineal foot *L* giving the uniform load per lineal foot on the girder.

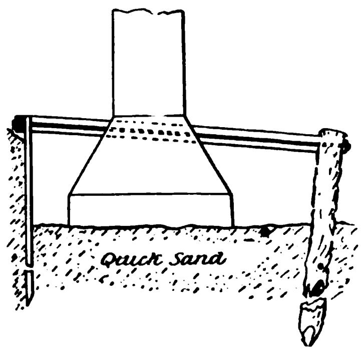

Fig. 77.

Thin Strata: — Ascertain the proper spread for the footings for a soil of the bearing-value of the soil given; then, if the thickness of the strata is three times the breadth of the footings, there will be no trouble. If the thickness is less, then the spread must be determined as for the under or softer strata, adding to the load from the footings the load from the upper strata; then, from the exterior lines so obtained, carry up lines at angles of 30° from the vertical through the harder strata to its top; the breadth between the lines will be the proper spread for the footings. If the hard strata is 2′ 0″ or less in thickness, then it should be disregarded.

Composite Soils: — Usually met with as rock over part of the site, and soft ground over the balance. If masonry walls are proposed, then the only safe course is to pile the soft portions, using the values for piles in Table XXXI. The piles must be very carefully driven to a firm bearing, and every part of the footings must rest either on the rock or on piles. If piles are too expensive, or require too much time, then the building must be carried on columns and the skeleton type of construction used. The loads must be spread over the soil by some of the means described where it is soft, and the column bases where the rock is must rest in boxes of metal thoroughly asphalted and filled with sand. The box should be made 12″ deep, and of the spread required for a firm sand; it must be firmly bedded in a thin bed of neat Portland cement, and in the centre must have a channel through which a 2″ pipe can run from the centre of the box to the outside. Then the erection may proceed as though there were no trouble, putting up the skeleton, filling-in the floor-arches, and loading the material for the fronts on the floors where needed. As the erection proceeds, careful levels must be taken and the settlement noted. Just before beginning the erection of the front, all columns resting on the rock must be brought to the level of the others by filling the sand-boxes with water and letting the sand flow slowly out through the 2″ tube. This must be done very slowly, and the level kept constantly in use. After all is level the front should be built. If the entire material for the front has been stacked where it was to be used, there will probably be no further settlement; if there is, it can be corrected by means of the sand, and will cause but little damage any way. During building the turn-buckles in the wind-bracing must be worked so as to avoid undue strains in these members in case of settlement.

Mud: — (*a*) Sheet-piles 5′ 0″ from footing-courses, held by wales, with the tie-rods 4′ 0″ *c* to *c*, held by piles driven on the inside of the footing-courses (Fig. 77); then concrete as above described; make spread as per Table XXIX.

(*b*) Sheet-pile as under (*a*), then fill with four or five feet of sand or gravel well compacted; cover with a layer of concrete 2′ 0″ thick, and start footings, or

(*c*) Preferably pile. In (*a*) and (*b*), make design such that a settlement of 2′ 0″ will do no damage.

Silt: — (*a*) Put sheet-piles 10′ 0″ from footing-course, and make provision in design such that a settlement of 2′ 0″ or 3′ 0″ will do no harm.

(*b*) Pile.

Rock: — When founding on rock, all loose, weather-worn or rotten rock must be cleaned off, and, if necessary, the rock

cut into horizontal steps; all cracks less in width than the footings are high should be filled with concrete of a thickness equal to twice the width of the crack.

If the crack is 3′ 0″ wide or more, it should be arched-over with hard brick in cement, four rowlocks thick for 3′ 0″ span, and one rowlock added for each increase in span of 3′ 0″. This arch should spring from skew-backs cut in the rock.

Should springs or streams be encountered, they should be led off in glazed earthenware pipes jointed with Portland cement, and of ample capacity.

When the rock has been dressed off ready for the foundation, it should be washed thoroughly with a hose stream, and then a layer of strong cement-mortar spread over it to start the masonry on.

Note: — For details regarding the substructures advised above, see "Substructure," Section IV.

(To be continued.)

ON ARCHITECTURAL PRACTICE OF THE UNITED STATES GOVERNMENT.[1]

THE details of the administration of the United States Government under an admirable constitution have been gradually but slowly developed from rude beginnings. Architecture and the other fine arts had long to wait their turn in a young agricultural and commercial country, and, as was the case in ancient Rome, had to depend for their development almost entirely on foreign genius and talent.

It was fortunate that during the early decades of this country, men of broad views, superior education and strict integrity, were called to the presidency and surrounded themselves with their peers in cabinet.

The first happy venture of the young republic in the realm of art was with a landscape-architect, Charles P. L'Enfant, an eccentric French major of General Washington's staff, who was intrusted with the design of the City of Washington and the location of the sites for public buildings.

After a long period of decadency in the fine arts a new era of classicism dawned upon Europe under the reign and impulse of the first Napoleon. It was reflected in this country, the Federal Government leading in the movement.

Congress providing the means, the selection of architects and methods of carrying on the works was largely left to the Executive.

Architects of acknowledged superior ability were applied to for designs, in competition or by special invitation. They received compensation and were retained at what were then considered liberal salaries.

The Capitol at Washington is a prototype of the architecture of that early day. In the year 1791 a premium of five hundred dollars ($500) and a building-lot in Washington were offered for the best design for the United States Capitol, and in 1792 the plans of S. L. Hallet, a French architect, were accepted. As the author of the plans, he was employed to start the work, but he retired before long. After many unfortunate vicissitudes, Benjamin H. Latrobe, a native of Yorkshire, England, was called from Philadelphia, and from the year 1803 to 1817 he reconstructed the work, freely developed, matured and executed the plans so that his name deserves to be recorded along with that of the author.

Shortly after the competition for the Capitol, a competition was started for designs for the President's house. Mr. James Hoban, a native of Dublin, Ireland, then a resident architect of Charleston, South Carolina, and a highly esteemed competitor on the Capitol designs, was successful. The work being intrusted to him, he had it sufficiently advanced for occupancy in the year 1799. The completed building was burned by the British, but was subsequently rebuilt by Hoban, and in this shape it stands to-day.

The first building for the Treasury Department was intrusted to George Hatfield, an English architect, who after Hallet's retirement had been called to this country to take charge of the work on the Capitol, but found it impossible to get along with the amateur commissioners of the District of Columbia. He finished the building in 1799. In 1801 a fire consumed part of it, and in 1814 the whole building was burned by the British. It was recommenced in 1817, finished in 1823, and again destroyed by fire on March 29, 1833.

In the second quarter of the century the above and other severe lessons led to the adoption, by the Government, of fireproof construction, but in design the slow progress consisted mostly of better adaptation of antique styles to modern requirements, in which, however, its designs were fully equal to the best class of work in the older States.

At the middle of the century the wants of a progressive nation had outgrown the size of the original Capitol, and plans for its extension were invited by a committee of Congress. A premium of five hundred dollars ($500) was offered to the successful author and the right was reserved to Government to combine the merits of various plans.

[1] A paper by Jeremiah O'Rourke, Supervising Architect of the Treasury Department, prepared for the Annual Convention A. I. A., but read before the World's Congress of Architects, at Chicago.

The successful competitor was Mr. Charles Frederick Anderson, an eminent architect of the City of Cork, Ireland, then recently settled in the United States. He was awarded the premium, which was paid, under President Fillmore's administration, from the Contingent Fund of the Senate.

Subsequently Mr. Thomas U. Walter, architect, of Philadelphia, and for years President of the American Institute of Architects, was intrusted with the work, under radical changes in the premiated design, and after many years of heated discussion, Mr. Anderson, by a Special Act of Congress, received additional compensation for the use of his, so far, underpaid plans.

While acting as Architect of the Capitol, Mr. Walter was intrusted with the designs of the extension and completion of the Treasury Department and Patent-office buildings, as well as of the picturesquely grouped buildings of the popular Soldiers' Home, since remodelled and extended by Mr. William M. Poindexter, the well-known architect, of Washington, D. C.

Before this time the Government did not erect many public buildings outside of Washington. It had been held that no public buildings besides those necessary for the custom-house service, mint, etc., could be lawfully erected under the constitution of the United States. Incidentally, however, a few marine-hospitals for the care of disabled sailors had been erected, and now a more liberal construction of existing laws began to prevail. It was held that where a custom-house was necessary space might be provided in the building for court-house and post-office purposes, those essential branches of the public service, and this tendency has steadily grown so that there are no more constitutional scruples about the erection of independent post-office buildings, and the "Government Supervising Architect" is intrusted, within the limitations enacted by the last Congress, with the erection and with the repair and preservation of all post-offices, court-houses, buildings for the customs service, mints, marine-hospitals, and such other buildings as may, by special legislation, be placed under his charge; numbering at the present time 297 buildings completed at a total cost of $99,000,000, and 95 in various stages of preparation or erection at a total cost, when finished, of $23,000,000.

ORGANIZATION OF THE SUPERVISING ARCHITECT'S OFFICE.

At the beginning of the administration of President Franklin Pierce, in 1853, the Government owned 23 completed and occupied buildings, and appropriation had been made for 15 new buildings. The construction of these buildings was intrusted to the Treasury Department, wellnigh everything, except the amount of appropriation, being left to the discretion of the then Secretary of the Treasury, Mr. Guthrie of Kentucky, who was in full accord with the new movement. No method or system had been devised nor means provided for the performance of the duties. Architect A. B. Young had just satisfactorily completed the erection of the Boston Custom-house and, with a view to develop the growing branch, Mr. Guthrie tendered him, all he could, a $1,500 clerkship in his Department. Simultaneously, with a view to an efficient management, he obtained from the Secretary of War the detail of Captain A. H. Bowman of the United States Engineers, and placed him in charge of the construction of these buildings. Though Captain Bowman was nominally Mr. Young's superior, both acted for eight years as colleagues and in full harmony — a duarchy at the head of a bureau existing without authority of law, but strong as the offspring of necessity. Carefully compiled regulations for the design and construction and the repair and preservation of all public buildings under the Department were draughted, accepted by the Secretary, and promulgated. These rules were gradually perfected so as to form the foundation of the complicated, but strong and efficient organization of the Supervising Architect's Office as it exists to-day.

The extent of the business of the Supervising Architect's Office will be appreciated when it is stated that during the last fiscal year ending June 30, 1893, there was expended for sites, construction and repair of buildings $6,741,286.11, and that the contract obligations amounted at the end of the year to $2,834,308.02.

In the transaction of the business there are employed at the central office 145 persons (50 of whom are females), and 180 persons as superintendents, clerks, foremen, etc., on the various buildings in course of erection throughout the country, from Alaska to Florida and from the Atlantic to the Pacific Ocean.

A large volume of administrative work is charged upon the office by reason of its facilities as a distinctive part of the machinery of the Treasury Department. Permanent and complete records are necessary, the detail of the variety of work must be systematically executed in accordance with well considered rules, in order to maintain correct and harmonious business relations with the other executive offices of the Government.

The office force is organized in ten (10) divisions, with a chief at the head of each, all reporting direct to the Supervising Architect, or to his Assistant and Chief Clerk, who acts as Supervising Architect during his absence. These divisions are:

1. Engineering and Draughting Division.
2. Law and Contract Division.
3. Construction Division.
4. Computing Division.
5. Repairs and Preservation of Public Buildings Division.
6. Accounts Division.

7. Tracing Division.
8. Records and Files Division.
9. Copyists' Division.
10. Photograph Division.

The titles of the divisions indicate generally the character and range of their duties, and but few explanations are required.

The Engineering and Draughting Division is charged with the making of all designs, plans and detail-drawings required for all the buildings erected, and with the correspondence relating thereto.

It usually employs the services of fifty (50) to sixty (60) expert draughtsmen, including specialists for steel and iron construction, heating and ventilating, and elevator and machinery work.

The draughtsmen are classified and arranged according to their special qualifications, so as to obtain the best results. The draughting-room, which is of large dimensions and well lighted, is supplied with all the best appliances required for a complete architectural and constructive-engineering office.

The salaries range from three to eight dollars per day. The office-hours are from nine to four, with time for lunch. Each draughtsman is allowed, in common with all the employés of the office, thirty days' vacation, with pay, and, in case of sickness, sixty days each year.

The other nine divisions work in harmony with the Draughting and Engineering Division, each through its chief reporting direct to the Supervising Architect, the whole forming probably the largest and best-equipped architectural office in the United States, perhaps in the world.

METHOD OF PROCEDURE IN PREPARING PLANS AND AWARDING CONTRACTS.

Before any money can be expended on a new public building, the Supervising Architect is required by law to make sketch-plans and estimates of cost, both of which must have the approval of the Secretary of the Treasury, the Postmaster-general and the Secretary of the Interior. The estimates of cost must be, in each case, within the limit of the appropriation made by Congress.

The approval having been obtained, the sketch-plans are returned to the Draughting Division for the preparation of scale working-drawings, which are made to show in full and minute detail all parts of the construction and finish of the building, both external and internal. These are passed through the Tracers' Division to the photographer for copying, and simultaneously to the Computers' Division for detail office-estimates of cost and advertisement for bids, thirty days being the usual time allowed to bidders.

An unusually large number of plans and copies of the plans and specifications of each building are required for circulation among prospective bidders, to whom, on application, they are sent by mail.

It is found that the number of scale-drawings required for each building ranges from thirty (30) to two hundred and twenty-five (225) sheets, and the average number of sets of scale-drawings required for estimates on each building is thirty (30) sets, exclusive of complete, full-sized working-drawings, which are always furnished after the contracts are awarded.

At the appointed time, the obtained proposals are publicly opened by the Supervising Architect, his assistant and chief clerk, and the chief of the Computing Division. A full record of the bids is kept and transmitted to the Secretary of the Treasury, with a recommendation to award the contract to the lowest responsible bidder.

On the approval of the Secretary, the successful bidder is notified, the contracts and bonds (five sets) are prepared in the Law and Contract Division and transmitted to the contractor. The contract having been signed, bond executed and vouched for by one of the designated Government officials, is returned to the Department, examined and passed upon by the Solicitor of the Treasury, and, unless there is some irregularity, work is started.

The contract contains generally a clause stating the time agreed upon for completing the work, and a *per diem* forfeit for failure to complete within the specified time.

METHOD OF PROCEDURE IN THE ERECTION OF BUILDINGS.

On the award of the contract, a "Superintendent of Construction" is appointed, and, according to the size and importance of the building, he is allowed a clerk and one or more foremen and watchmen to assist him in the performance of his duties.

The soil under the foundation has generally been previously tested by excavation, boring or other reliable method, and, unless unexpected impediments are encountered, the work progresses regularly, the "Superintendent of Construction" reporting by mail or telegraph to the Supervising Architect, monthly and whenever necessary, up to the time of completion.

At intervals during erection and before final acceptance, each building is visited, examined, controlled and reported upon by "Inspectors of Public Buildings," all working under specific written instructions from the Supervising Architect's Office, and reporting thereto in writing and in detail up to the completion of the contracts.

Payments on account, based on quantities and value of the work actually incorporated into the building, are made monthly, retaining ten per centum of the estimated value until completion and final acceptance of the work.

It may be stated in conclusion, and in justice to the Supervising Architect's Office, that while it may be admitted that the work turned out by this office might, and doubtless will, be improved, still a just comparison and analysis would seem to indicate that, all things considered, it will compare favorably in design, arrangement, construction and cost with similar works erected by either States, municipalities or private enterprise.

It may be proper also to state, with reference to the amount paid by the Government for the professional services rendered by the Supervising Architect's Office, that the records of the office show that the amount paid for said services never exceeds five per cent on the cost of the buildings erected, although the usual proportion of such services are of a character which usually commands, in private practice, a much higher professional fee.

The Supervising Architect himself, for professional services which, in private practice, would easily net $100,000 a year, receives the munificent salary of $4,500, with strictly limited travelling expenses.

THE CONSTRUCTION OF THE WORLD'S FAIR BUILDINGS, BRIDGES, PIERS AND DOCKS.[1]

WHEN Mr. Burnham, in March, 1891, ordered the constructional plans of the Exposition buildings to be made, the nature of the soil of Jackson Park, as regards its bearing-capacity, was practically an unknown quantity. The first step, therefore, was to determine by borings and loading-tests the nature and capacity of the soil.

Over two hundred borings were made on the site of the main Exhibition buildings, and the soil was found to be as follows:

	Fill.	Black soil.	Sand.	Soft sand.	Clay.	Hard pan.
Art Building......		0.5	1.0	13.0	15.5	27.0
Fisheries..........		3.7		12.0		14.5
Government......		1.9	1.6	13.0	16.0	28.0
Manufactures North half......	1.0	1.0	1.2	13.0	13.0	25.2
Manufactures South half......	1.4	2.7	1.3	10.4	11.0	22.8
Agricultural Northeast half..	1.5	2.1	2.0	5.0	23.0	28.0
Agricultural Southwest half..	2.2	3.1	1.1	12.6	13.5	27.0
Machinery Hall...	2.2	1.0	1.8	10.0	16.0	27.2
Administration ...			3.0	12.0	9.0	20.0
Electricity and Mines.........		0.5	5.5	11.0	13.0	25.2
Transportation....		0.5	4.5	11.0	8.5	17.5
Woman's Building.		3.0	0.5	13.5	3.0	12.0

Or, to put it concisely, this was an average of 1 foot of black soil, 2 feet of sand, 11 feet of what was called in the reports quicksand, but which is not a true quicksand, but simply sand saturated or partly saturated, 13 feet of clay, generally soft, and then hard-pan at an average depth of 27 feet.

Loading-tests were made to determine how much it was safe to put upon the soil per square foot; also whether the soil would squeeze out under pressure, as most of the large buildings were designed to stand close to the lagoons.

Under a load of 1 ton per foot for 48 to 64 hours, the settlement was found to be from ⅛" to 1¼" everywhere, except in the swale spoken of below.

A test was made 12 feet from the lagoon at what is now the northeast corner of Electricity Building. A platform 4 feet square was laid on natural ground, simply levelled off. On this platform 22 tons were placed, a load of 2,750 pounds per square foot. It remained 15 days, with a settlement in that time of ¼". On the fifteenth day a trench 4 feet away from the platform was dug 3 feet wide and down to the soft sand. In 48 hours the platform went down ⅛", but no further settlement was detected after that.

Loading-tests, which were made later in the summer, showed as follows: At the north end of Manufactures Building, under a test of 17 tons on 9 square feet, the first 48 hours the ground settled ⅜", in 72 hours ½"; no change after this.

The soil at the south end of Manufactures Building, in the swale spoken of below, with 3,161 pounds per square foot, on a base 3' x 3'-1", showed a settlement of 8" while loading, and in 90 hours had settled 38". It was still settling, but the test was stopped at this point.

In the Agricultural Building, in this same swale, with approximately the same load per square foot, a settlement of 14" in 144 hours was found.

At south end of Stock Pavilion, the settlement in 144 hours was 8".

In the south end of Transportation Building, in 120 hours, with the same load per square foot, the greatest settlement was 2¼".

At the south end of Government Building, with a load of 3,700 pounds per square foot, the settlement in 24 hours was ½". Load was kept on 90 hours, but no further settlement occurred.

[1] A paper prepared for the Annual Convention, A. I. A., but read before the World's Congress of Architects, at Chicago.

It was considered safe, from this showing, to use spread foundations, which made a saving of about $6,000 per acre over using piles. These spread foundations were made of a crib-work of timber resting on plank and supporting the posts of the building.

A crescent-shaped swale of muck, spoken of above, probably the bed of an old creek, was found, with one arm extending from the east centre of the Manufactures Building, running southwest and crossing the present basin a little in front of the McMonnies Fountain, then turning southeast and running through the northeast portion of the Agricultural Building. This made it necessary to pile practically the south half of the Manufactures Building and the northeast portion of the Agricultural Building.

When the trusses over the court in the Manufactures and Liberal Arts Building were designed, their foundations were made of piles with a timber grillage on top. These pile foundations were designed to take care of the extra thrust of the arches due to wind, the tie-rods between the feet of the arches being designed to only take care of the thrust from dead load.

The foundations of the Art Building were made of concrete. All the other foundations of the buildings, including Machinery Hall, were made spread.

It was understood that the architects furnishing plans of the buildings should not be made responsible for the construction, and should not be called upon to make any constructional plans; accordingly, all the construction, both in wood and iron, was designed in Mr. Burnham's office. The only exception was in the Mines Building, where Mr. Beman showed the cantilever trusses, and they were built in compliance with his desire. They are interesting as adding another type to the variety of trusses in the Park, although they are not at all economical.

The object sought in the construction of the buildings was the greatest economy consistent with perfect safety. To this end the buildings, as at first designed, were almost entirely wood. The trusses, with the exception of the Mines Building, were wood or combination.

The domes in the Manufactures Building, as then designed; in the Horticultural and Administration Buildings were steel from the ground up, and in the Agricultural and Fisheries were steel tops, the lower portion being of wood. Later it became evident that true economy demanded the use of more iron in the construction, and when, from the desire to get more space, and for other reasons, it was determined to roof over the court in the Manufactures Building, thus doing away with the dome first talked of, it was decided to make this of one span. The court of the Electricity Building was also roofed over with steel trusses. The trusses and domes of Machinery Hall, the construction plans of which were begun about this time, were also made of steel.

The very different buildings of necessity brought out a great variety of trusses, and a multitude of new details.

Some of the trusses while theoretically correct were found to be practically bad. For instance the bow-string trusses in the curtain of the Horticultural Building were designed with the upper chord made of boards nailed together. The drawings called for them to be extra nailed, and the contractor claimed he took extra precautions, but when he came to adjust them it was found that the boards would slip past each other, and the chord flatted under the pull of each rod.

In the Forestry Building the trusses were all made of wood, wooden pins being used instead of nails.

In many cases it was found impossible to properly brace against wind-pressure without making use of the sheathing on which the staff was to be nailed. It was, therefore, laid diagonally. This was notably the case in the towers of the Electricity Building, where 2″ sheathing was laid diagonally, and the number of nails in the ends of each plank was specified.

The maximum load placed on the soil in all the buildings throughout the Park was 2,500 pounds per square foot. This included live and dead load, and the vertical component of the wind-pressure. When piles were used, the load per pile was from ten to fifteen tons; the latter being the maximum used. The contractors were not required to put foundations below frost line, but simply to remove whatever black soil or fill there might be, and get a level bed on the sand.

The main floors of all the buildings, except Machinery Hall and Mines Building, and those parts of the roofs used for gardens or restaurants, were figured for 100 pounds per square foot, live and dead. Machinery Hall floor was figured for 250 pounds per square foot, and Mines Building for 150 pounds.

The galleries of all the buildings were figured for 80 pounds per square foot. Roofs were figured for 40 pounds per horizontal square foot, or 25 pounds vertical load, and 20 to 30 pounds wind-pressure, depending on the exposure of the building. The method giving the greatest result was used. Purlins and jack-rafters 30 pounds per square foot.

The bridge-builders' standard specifications were used for all the iron-work, except the Manufactures' trusses. At first 1,500 to 1,800 pounds fibre-strain was used for white pine, tension up to 2,000; bearing, perpendicular to fibre, up to 800 pounds.

It was decided during the progress of the work that these strains were all too high, inasmuch as they called for a quality and an inspection of lumber which could not be obtained.

The matter was gone into exhaustively, and a careful study made of the recent tests on timber made by the United States Government at Watertown; also those made by Professor Lanza, of the Massachusetts Institute of Technology, and the following unit strains were adopted for white pine, yellow pine and oak, being allowed 33 to 50 per cent more:

Fibre-strain, 1,200 pounds; this not to be exceeded in any case. Bearing perpendicular to fibre, 300 pounds; shear, with grain, 100 pounds; bearing on end of timber, 800 pounds; compression, when ratio of length to least side of cross-section did not exceed 10, 800 pounds; 10 to 35, 600 pounds; over 35, 400 pounds.

Experience has proved that these strains are not too low. In the case of the large tanks of the Sewage Cleansing Works, the Assistant Engineer who figured out the sizes of timber to be used disregarded the standard unit strains, and allowed a pressure of nearly 500 pounds on the 8″ x 10″ white-pine ring supporting the whole weight of the tank. This 8″ x 10″ has crushed-in over ¾ of an inch. In two cases in Machinery Hall foundations, the wood was indented about ¼ of an inch under a load of less than 300 pounds. These are the only instances which have been noted.

The arches over the Court of the Manufactures and Liberal Arts Building were figured for a vertical load of 42 pounds, made up as follows: iron 20, roof 10, snow 12. A recalculation made after the roof was completed, taking shipped weight of iron, showed weight of iron on straight part of roof to be 22½ pounds; roof 8 pounds, leaving 11½ pounds for snow. The arches were also figured to withstand a wind-pressure of 30 pounds per square foot, acting horizontally against the wooden structure which surrounds the court, concentrated at that point of the arch where the combination truss is connected to it. It amounted to 90,000 pounds at this point, 76 feet above the bottom pin. In addition to this a wind-pressure of 30 pounds per square foot was taken, acting at an angle of 20 degrees with the horizon, extending over the whole roof. For the combined strain from wind, dead and snow loads, the unit strain was taken at 30,000 pounds per square inch. The connections, however, were made 50 per cent stronger than this.

The specifications sent to bidders on these arches called for either Bessemer or open-hearth steel, not to contain over .08 of 1 per cent of phosporous; to have an ultimate strength of not less than 66,000, nor more than 74,000 pounds, with an elastic limit of not less than 37,000 pounds; an elongation of not less than 16 per cent in 8 inches, and a reduction of not less than 25 per cent at point of fracture.

Over 3,500 tests of this material were made by Messrs. Estrada, Kenyon & Gray, the inspectors, with the following average results:

Elastic limit, 40,000 pounds; elongation in 8 inches, 27 per cent; reduction at point of fracture, 57 per cent. The unit strain of 30,000 pounds is higher than has been used before, and it was severely criticised in the early stages of the construction; however, it was put at that figure after a thorough study of all the conditions involved, and as it represented a saving of $75,000 to $80,000 over the strains used heretofore, the writer feels that he was justified in adopting it.

The only difficulty found in designing the bridges was the fact that the fire-boat had to go under, and the fire-engines, and in two cases a railroad track, over them. The clearance demanded for the fire-boat and launches made the floors steeper than they otherwise would have been. The three canal bridges — that is, the ones at the northeast and southeast corners of the Electricity Building, and the one from Machinery Hall to Agricultural Building — are plate-girder cantilevers, with three openings, central opening 54 feet, and two side openings 31 feet. This system was made necessary by the shallow depth allowed for the ironwork and the floor. Each bridge is 60 feet wide, and is made of seven plate girders, connected by bracing, having the joists resting on shelf angles just below the top flange of each girder. The two south bridges carry railroad tracks, and the two plate girders under each track were made heavier, and ties used instead of joists. The two bridges at the Peristyle are wood: all the balance are iron, made of three or four (depending on width of bridge) curved lattice-girders. The floor was constructed similarly to the canal bridges.

The docking around the interior waterways was made, where the banks were high, of a row of piles faced with a sheet-piling made of two thicknesses of 2-inch plank. This row of piles was tied back by iron rods to a row of anchor piles. The piles and lumber used in this docking, as well as the piers, were all soft wood, the only requirements in the piling specifications being that the piles should be 10 inches in diameter at centre, and be able to withstand the blows of the hammer.

The first pier built at Jackson Park was a T-shaped pier, with a breakwater some distance away on the north and east, on the site of the present Casino Pier. This was afterwards taken out, and the present pier, 2,400 feet long and 250 feet wide, built. The breakwater of this pier was made part of the pier, extending along north side and east end. The breakwater was made of two rows of closely driven piles, held together with iron rods and filled with stone, increasing in width with the depth of water. The balance of the pier was made of piles, 14 to 16 feet centres each way, capped with 12″ x 12″ timber; these caps carrying the joists and floor. Mooring-piles are placed about 3 feet inside from the edge of pier, securely braced, but not carrying caps or joists.

The 59th Street Pier is similar in all respects to the Casino Pier; as is the Van Buren Street one, with the exception that the latter has no stone breakwater.

The cost of the arches over the court of the Manufactures and Liberal Arts Building was $1.10 per square foot of ground covered. The cost per square foot of the whole building, including decoration, was $1.39. Transportation Building, including sculpture and decoration, $1.08; Electricity Building, $1.69; Machinery Hall, $2.12; Agricultural, $1.44; Administration, $9.18; Van Buren Street Pier, $.21; Casino Pier, $ 21; Breakwater, Casino Pier, $1.80; Horticultural, $1.41; Mines & Mining, $1.04; Fisheries, $2.35; Forestry, $.75.

As one of Mr. Burnham's staff I cannot close this paper without paying a tribute to our Chief.

You all know of the personal sacrifices he has made for this work; of his untiring energy, and his constant devotion to the interests of the Exposition, and you also know of his masterly executive ability. But you may not recognize what a tower of strength he has been to those who have been associated with him as members of his staff. His grand courage has always been an inspiration to us. If we had doubts; if we were discouraged; if, as often happens in any great enterprise, we felt like throwing up the sponge, we had only to turn our eyes to him and gain new strength and new encouragement from his undaunted spirit. He always led as a true leader should. If he asked us to work until two in the morning he was sure to be at work with us, and worked longer and harder.

His loyalty to his staff was so consistent and so unchanging that each of us felt he had the perfect trust and confidence of the Chief. This loyalty has been our greatest stimulus and our greatest support at all times and in all difficulties.

He is indeed the man who built the Fair.

E. C. SHANKLAND,
Chief Engineer, World's Columbian Exposition.

THE UTILIZATION OF GARBAGE.[1]

THE immortal Justus Liebig, the founder of agricultural chemistry, and, indirectly, by his teachings, the creator of the industry of artificial fertilizers, combined in himself the qualifications of a most eminent chemist and a far-sighted national economist.

He transformed the chemical doctrines of plant nutrition at once to available figures for the farmer to show him, in clear and indubitable sentences, the laws of nature which compel him to restore to the soil what he has taken from it in the form of the products of the field.

His classical "*Chemical Letters*" are a monument he has erected for himself which will endure as long as the conditions of this globe remain the same as they now are. As long as the human race lives, the fundamental laws requiring the restitution to the soil in available form of the constituents of the plants as laid down by Germany's most eminent agricultural chemist will be written in golden letters in the history of all civilized nations.

In centuries to come the classical works of Liebig will be revered as the revelation of science respecting the practice of agriculture.

In his forty-seventh letter, Liebig refers especially to the relation of the consumption of the great cities to the products of our farms. From each hectare of wheat-field, the farmer, from the return of an average harvest, transports from his farm to the consumers, 4,000 pounds of grain containing seventy pounds of mineral substances, mainly phosphoric acid and potash.

The refuse of a city of 1,000,000 inhabitants will amount, in dried form, per annum, to 45,000,000 pounds.

The constituents of this powdered material are 10,300,000 pounds of mineral substances, mostly the mineral parts of breadstuffs and meat, which contain no less than 4,580,000 of phosphatic salts.

The removal of this precious material (at the rate above named) from the fields has been going on for centuries and only a small portion of it finds its way back to the fields. It is folly to think that the loss of this material has had no detrimental influence upon the fertility of the soil. . . .

For the sake of convenience we pollute our rivers and choose rather to suffer the consequences of drinking polluted water than to adopt rational measures to save, for the enrichment of our fields, the products which the law of nature has provided for the very purpose.

Our antipodeans, the much-despised Chinese, are much better practical economists than their civilized brethren. In China, nothing is allowed to go to waste that is useful to the soil. The Chinaman's house is without the improved devices of the modern plumber, and his scent for nuisances may not be so highly cultivated as ours, but by his system of the strictest economy, he manages to keep up the fertility of his soil to so high a degree, that the vast empire, notwithstanding that it possesses the densest population on the face of the earth, is entirely independent of all other nations, not only for the breadstuffs and other food supplies required for the sustenance of its people, but also for the fertilizing materials needed for its soil. The Chinese, with the instinct of self-preservation, have been doing for centuries what Liebig and his followers taught the civilized nations of the world in the beginning and middle of the present century.

To-day we have fleets engaged in transporting phosphoretic and nitrogeneous materials from continent to continent; the services of the miner and the skill of the chemist are required to supply this food-material to our exhausted fields. The nitrate mines of Chile, the phosphate beds of South Carolina and Florida, of Belgium and Russia, the mountains of apatite rock of Estremadura and the deposits of the same material in Canada, the potash salts of Germany and Hungary, are drawn into the service of agriculture. One of the most gigantic branches of the chemical industry has been built up in order to balance the debit and credit page of the rational farmer in the records of his culture.

But in seeking for remedies that will preserve the fertility of our fields, it is a remarkable fact that a vast amount of waste material which lies right at our feet, is not given a thought. It is true that all the more valuable waste materials, such as bones, tankage, cracklings, cotton-seed meal, leather, hoofs, horns, etc., have a stable market. But the poorer and much more abundant materials have been, and are now, almost entirely neglected.

We will to-night direct our attention to the question of the possibility of utilizing the garbage of our city, which, at the present writing, is the subject of much discussion.

Until recently the garbage collected in this city has been used mainly as a feeding material for the fattening of pigs in the outskirts. For sanitary reasons, the Board of Health has banished the piggeries outside the limits of the County of Philadelphia. This is very commendable to free the city of a nuisance, which at the best was a very crude method of disposing of the material, and which, by the carelessness of those who make a business of it, certainly created a health-endangering nuisance; but the decision of the Board of Health made the disposal of the material very much more difficult than before.

The City of Philadelphia is divided into five districts for the collection of garbage. During the summer months, from June to September, the accumulation of a single district runs to 100 tons per day, while in the other months of the year the daily output varies, and in the middle of the winter falls to twenty-five tons per day. A general average for the whole year is about 250 tons per day for the whole city. This estimate we can safely use for calculation of returns but not as a basis for the construction of a plant, for which the maximum figures will have to be taken. For the first district, comprising all that part of the city south from South Street, from river to river, a furnace for the cremation of garbage has been erected, situated on Washington Avenue and Twentieth Street.

Unquestionably cremation is the most complete system for destroying all organic substances, and doubtless to the extreme sanitarian the only method that should be adopted.

But what about the economical results? The daily operation of the furnace requires labor and fuel, the product of a cremator is a small quantity of ashes and worthless at that. Four or five per cent of ashes is all that remains of the garbage when incinerated.

The American Incinerating Company, with headquarters at Washington Avenue and Twentieth Street, has offered its product to the fertilizer trade. I have here a sample of these ashes which were sent to us. Our analysis yielded us:

Total phosphoric acid = 15.32 per cent (= 33.88 per cent phosphate of lime), potash 0.25 per cent, soluble in water.

I was astonished to find so little potash, but the intense heat in the furnace has driven off a part of the alkalies as chloride vapors, otherwise the analysis should show at least four times as much. This ash, even with fifteen per cent phosphoric acid, has a very low market value because natural phosphates in bags, and ground to the finest powder, can be laid down at our doors at $5 per ton.

The phosphoric acid of such low percentage is valueless for dissolving purposes because it will only yield practically a powder containing five to six per cent of available phosphoric acid. This low product cannot be used for mixing fertilizers and it cannot be offered to the market when acid rocks containing thirteen to fourteen per cent of available phosphoric acid are offered as low as $10 to $12 per ton.

The products of the cremating process, therefore, will never become a commercial article. The question then arises: Can the same sanitary requirements be reached in another way? Without doubt they can, and, at the same time, the valuable constituents of the garbage destroyed in the furnace can be saved.

The city garbage, embracing all the refuse from the table and kitchen, changes its qualities considerably with the season. Just now we are in the vegetable period and the results of my experiments represent about the lowest results obtainable.

The experiments I have made are not laboratory experiments, but practical manufacturing experiments, handling at a time from six to twelve tons of material. I have been in the fortunate situation of being able to utilize, at intervals, apparatus designed for other purposes but very well adapted for the purpose of these experiments.

There is no secrecy about the principle of rationally utilizing garbage, and there are no new processes involved for which enormous patent fees will have to be paid. The process is divided in two main operations:

(1) The separation of the grease by extraction.

(2) The drying of the remainder to form directly a salable product.

The results I have obtained yielded me about seventeen per cent, on an average, of dry product from garbage tankage, a sample of which you have before you. This dry tankage is a very excellent fertilizing material. Its composition is:

[1] Extracts from a paper by Dr. Bruno Terne, read at the meeting of the Chemical Section of the Franklin Institute, held June 20, 1893, and printed in the *Journal* of the Society.

	Per cent.
Moisture	4.41
Organic matter (including 4.3 per cent NH_3)	73.34
Mineral matter	22.25
	100.00

On a smaller scale than that which could profitably be carried on in Philadelphia, garbage is utilized successfully in this way in several places. I have received from Detroit samples of fertilizer made from garbage with as high as 5.37 per cent ammonia, 6.08 phosphoric acid; and, at another time, 3.76 per cent ammonia, 3.36 phosphoric acid.

A specimen from Providence contained 3.55 ammonia, 3.38 phosphoric acid; from other places, 3.86 ammonia, 3.51 phosphoric acid.

A fair average analysis, showing the minimum and maximum of what we may export, is as follows:

	Per cent.	Per cent.
Ammonia	3.50	4.50
Phosphoric acid (corresponding to phosphate of lime, 6.54, 13.28.)	3.	6.
Water soluble potash	0.25	0.50

At the present market price the unit of ammonia is sold at 2.60. This would give, for the low grade, a market value of $9.10 per ton; for the high grade, $11.10 per ton.

It is safe to say that at the present market these products will realize $10 per ton. I leave phosphoric acid and potash out of the calculation to give you the practical valuation. This material is a most excellent fertilizer, not only chemically but also physically, and its usefulness in the manufacture of fertilizers is without limit.

The amount of garbage tankage produced from a ton of material as gathered up from the houses, placed at the lowest percentage (viz, about fifteen per cent), amounts to 300 pounds per ton. One hundred tons per day will give 30,000 pounds or fifteen tons daily.

Taking the daily average of one district, we will average seven and one-half tons, or 2,250 tons per year; and for the five districts, 11,250 tons, having a market value of $112,500.

Now, let us see what we restore to the fields in this amount of products.

The ammonia taken at four per cent in one ton of the tankage contains eighty pounds of this important plant food, and 112,500 tons, or the amount of production from the garbage of this city should be equivalent to a saving of 9,000,000 pounds of ammonia, 9,000,000 pounds of phosphoric acid, and 500,000 pounds of potash.

All of this has been taken from our fields, and, if wasted or destroyed, represents so much loss to the community at large, but if this amount be regained and restored in proper form to the farm and garden, it means so much saving. All of this amount must be restored from other sources in some way. If any waste material is worth saving it is surely the garbage of the cities, as I have endeavored to show.

There is another feature connected with this waste, viz, the regaining of the grease contained in garbage.

City garbage, at a low estimate, will yield three per cent of a black grease, which you see in the samples before you. Even for this black grease, there exists a limited market at low figures for lubricating purposes (for car wheels). This black grease rarely contains much free fatty acid, but it is by no means free from it. I have had samples containing over six per cent.

If the regular production should rise to such quantities as the garbage of the whole city will permit of producing, other uses must be found for this product, which in the crude state has but a limited field of usefulness. There are ways and means known to the chemist, however, to improve this raw product, and the refined material made from it will readily find a market in competition with other greases.

The result of a chemical artifice of this kind, I take pleasure in introducing to your notice in the sample before you. The method employed by me in this work is absolutely practical in respect of quick action, cheapness and positive results.

The grease stock so produced is very oily at 60° F. It yields about seventy to seventy-five per cent of this very fine oil which will find a ready sale. This oil will prove a puzzle to the best expert in the analysis of oils, for it contains traces of all oils and greases which enter the kitchen. It will challenge the reliability of all the color tests, the iodine numbers, etc., but in spite of its evasion of the methods of a Mailliau and Benedikt, it will find an excellent market. The refined grease is a very fine soap-stock, and a very crude product of a test in that direction I have with me. This soap is made solely from the same grease you have before you.

The rational mode of disposing of the city garbage is as simple as anything can be.

First, to gain all the grease, we must apply practical methods of extraction by known solvents; then, to save the fertilizer materials, we must employ the most rapid and economical methods to expel the eighty per cent of water contained in the material.

Small amounts are easily handled; the difficulty arises when such enormous quantities stare one in the face. It is not, therefore, so much the chemical processes employed as the proper disposition of the plant, which must be well understood.

The stock delivered at the works must disappear in the process, on its arrival, and must never be permitted to rest for a moment until, after forty-eight hours, it is ready to be filled into bags for shipment in the form you see before you in this sample. It is no more difficult to handle the enormous quantities of garbage than it is to handle the animal refuse of our city.

My experience of many years in handling materials of this kind in enormous quantities, first in Chicago, and since 1877 in this city, as the chemical manager of the largest works of its kind, permits me to speak advisedly on this subject, and I am prepared to stake my reputation as a technical chemist on the assertion that the utilization of our city garbage can be carried on as a financially successful operation for the saving of the valuable materials contained therein. How important the solution of this question is for the City of Philadelphia is well illustrated by the constant discussion of the subject in the daily papers.

Cremation, as I have shown, produces, at considerable expense, a valueless product. The rational chemical process yields, at no more cost, products which make a large figure in the housekeeping of a community.

Should we cast aside the warnings of an economist like Carey? Shall the teachings of Liebig and of all the prominent agricultural chemists of all nations have been in vain? I trust not, and believe not.

In this century of progress, with our knowledge of chemistry, and with the most complete machinery at our disposal, it seems to me like a lapse into barbarism to destroy this most valuable material simply for the purpose of getting rid of it, while at the same time, we are eager to obtain these very same materials for our fields by purchase from other sources.

There is no doubt in my mind that this question of the disposal of our garbage can be solved by careful consideration of all points, by practical business men, to the advantage of the city authorities and the contractors for this work, to the fullest satisfaction of the health authorities, and to the benefit of the farmer.

Capital intelligently invested should be productive, not destructive. Instead of spending thousands of dollars for the erection of crematories to destroy, let us erect sanitary chemical-works to preserve, this valuable material. There can be no danger to the public health in the conduct of a rational system for the utilization of garbage. All microbic carriers of contagious sicknesses are destroyed by a temperature of 212° F., and this dry product you have before you is as harmless to the public health as the flour in the barrel.

My desire and expectation to-night, in making this presentation of an important industrial and sanitary problem, is to receive the endorsement of the Section, and later on, that of the Institute, to have you condemn the destruction of these valuable waste products, and approve, as the only right solution of this question, the preservation of these products displayed before you by a rational process of manufacture such as that indicated above.

THE DUODECIMAL *VS.* THE DECIMAL SYSTEM.

MR. JESSE A. STOTT, of Manchester, Eng., addresses to *Engineering* the following very reasonable suggestion as to the advantages of a duodecimal over the decimal system and the propriety of reducing all English measures to a uniform system with twelve for a base:

The facility of multiplying and dividing by 10 with our present or Arabic notation has invested that number with a mystical virtue in the minds of many people. I had that same reverence for 10 until a year or two ago, when owing to Mr. Kesselmeyer, of Altrincham, advocating a change in the basis of our notation from the number 10 to the number 12, I began to think on the subject. It is merely because in the Arabic notation the change from numbers represented by one digit to those represented by two digits occurs at 10, that the facility of calculating in that number happens, and if any other number be chosen as the one at which that change is made, it acquires the property appertaining to 10 in the Arabic notation. For instance, let there be only seven digits and a nought, then the signs 10 would represent not a 10 but an 8, and 100 would represent 8 by 8 or 64 in the Arabic notation. Now 8 is a better number than 10, because it can be divided into halves and quarters without going into fractions, which is more useful than halves and fifths; multiplying and dividing by merely adding or cutting off a nought will apply to 8 if it is made the first double number, just as it now does to 10, whilst 4 will obtain the facility at present applying to 5, with the advantage of being halved without going into fractions. I therefore hold that 8 would be a better number for the basis of a notation than our present 10.

Mr. Kesselmeyer, however, has the boldness to advocate the change of our notation from a basis of 10 to a basis of 12. Twelve is the first number divisible, without fractions, by four other numbers; none of the lower numbers being divisible by more than two numbers, omitting the unit in both cases, and Mr. Kesselmeyer maintains that it is the natural basis for calculation. It is divisible without fractions into halves, thirds, quarters, and sixths, and this is why we find our foot of 12 inches and our shilling of 12*d.* so convenient, and why so many articles are sold not by the ten and hundred, but by the dozen and the gross. If our system of notation were made to correspond with our natural systems of calculation, Mr. Kesselmeyer maintains

that we should have a much better system than the metric; we should require two more digits to represent our present 10 and 11, and then the signs 10 would represent 12, 100 12 times 12 or one gross, 1000 twelve gross, and so on, and the facility of multiplying and dividing by 10 and 5 under the Arabic notation would apply to 12 and 6 under the new notation.

Mr. Kesselmeyer points out that a gold coin of 12*s*., which he proposes to call a Victoria, might easily be brought into use, and for convenience a 24*s*. gold-piece Victoria 2.0 (new notation).

Our present foot divided into 12 inches appears to me a more serviceable unit than a metre. The inch could be conveniently divided into twelve parts as in duodecimals, which would then be the natural decimals, and these again into twelfths, easily readable on a draughtsman's ivory scale, or in spaces of three-twelfths each on a rougher scale.

The present inconvenient method of measuring a building estate by chains and links, and selling the land by the square yard, would cease, as 72 feet (60, new notation) would make as handy a surveyor's chain as 66 feet, two chains making 100 feet (new notation), that is, one gross or 144 feet Arabic notation.

Our measurements and our money would then be quite as symmetrical as under the metric system, and very much more natural and practical.

The day is already divided into twenty-four hours or two twelves, but probably twelve hours divided into twelve spaces, and the latter each into twelve smaller spaces, which would be five-sixths of our present minute, would be better.

I am afraid our system, or rather want of system, of weights and measures (except of length) is so bad that nothing can be made of it except complete revision; this could be based on the dozen instead of the ten.

After having thought the matter over for some time, I agree with Mr. Kesselmeyer that a system of notation based on the dozen or twelve, with systems of weights, measures, money and time to correspond, would have great advantages over the metric system, which is based on a notation that has adopted not the best number (twelve), nor the next best(eight), but only the third best, namely, ten.

Whether it is practicable to introduce a new notation is a question that would require grave consideration, as I do not see that we could afford to throw this generation into confusion for the benefit of posterity, but before we commit ourselves to the metric system, I think the idea is worth discussion. I expect to be told that the idea is old as the hills, but never having read or heard of it, and finding others in the same ignorance, I venture to ask for space in your valued periodical to call attention to it.

If a new notation is not practicable, I am strongly in favor of the metric system, and I believe the people would get into the way of it with little difficulty. The first time my firm made drawings for buildings, including constructional ironwork for the Continent, our assistants worked to the metric system, with which they were previously unacquainted in practice, without the slightest difficulty and without error.

THE ILLUSTRATIONS

[*Contributors of drawings are requested to send also plans and a full and adequate description of the buildings, including a statement of cost.*]

THE EQUITABLE LIFE INSURANCE BUILDING, DENVER, COL. MESSRS. ANDREWS, JAQUES & RANTOUL, ARCHITECTS, BOSTON, MASS.

[Gelatine Print, issued with the International and Imperial Editions only.]

SPIRE OF ST. MARY'S CHURCH, OXFORD, ENG. SKETCHED BY MR. T. MACLAREN, LATE PUGIN TRAVELLING-SCHOLAR.

[Issued with the International and Imperial Editions only.]

THIS sketch is interesting in view of the proposed restoration which has been mentioned several times of late in this journal.

A VENETIAN DOORWAY. AFTER A WATER-COLOR DRAWING BY MR. W. M. MACCAFFERTY, BROOKLYN, N. Y., *American Architect* TRAVELLING-SCHOLAR FOR 1892.

[Issued with the International and Imperial Editions only.]

DESIGN FOR A CAFÉ FOR A WORLD'S FAIR. SUBMITTED IN A COMPETITION OF THE ROCHESTER SKETCH-CLUB BY MR. W. H. ORCHARD, ROCHESTER, N. Y.

[Issued with the International and Imperial Editions only.]

To this design was awarded the first place.

TWO HOUSES AT OVERBROOK, PA., FOR MESSRS. WENDELL & SMITH. MESSRS. BOYD & BOYD, ARCHITECTS, PHILADELPHIA, PA.

HOUSE AT OVERBROOK, PA., FOR MESSRS. WENDELL & SMITH. MR. HORACE TRUMBAUER, ARCHITECT, PHILADELPHIA, PA.

PASSENGER-STATION AT DUBOIS, PA. MESSRS. GORDON BRAGDON & ORCHARD, ARCHITECTS, ROCHESTER, PA.

PASSENGER-STATION AT BRADFORD, PA. MESSRS. GORDON BRAGDON & ORCHARD, ARCHITECTS, ROCHESTER, PA.

STATION AT STOCKBRIDGE, MASS. MR. FRANK WALLER, ARCHITECT, NEW YORK, N. Y.

THE residents of the town contributed $2,000 to aid the railroad in substituting for the wooden building destroyed by lightning last summer the present stone structure.

HOUSE FOR PAUL TUCKERMAN, ESQ., TUXEDO PARK, N. Y. MR. JAMES BROWN LORD, ARCHITECT, NEW YORK, N. Y.

[Additional Illustrations in the International Edition.]

MAIN STAIRCASE: EQUITABLE LIFE INSURANCE BUILDING, DENVER, COL. MESSRS. ANDREWS, JAQUES & RANTOUL, ARCHITECTS, BOSTON, MASS.

[Gelatine Print.]

CORRIDOR: EQUITABLE LIFE INSURANCE BUILDING, DENVER, COL. MESSRS. ANDREWS, JAQUES & RANTOUL, ARCHITECTS, BOSTON, MASS.

[Gelatine Print.]

STANMORE HALL.—LOWER STAIRCASE.

PLAS MADOC, NEAR LLANRWST, NORTH WALES.

PLAS MADOC (the residence of Colonel John Higson), which is being altered and added to from designs prepared by Messrs. Dawes & Hoyland, of Manchester, is now approaching completion so far as the structural work is concerned. The decorative features internally are in course of preparation and it is expected will shortly be completed. The arrangement of rooms is shown on the plans. That arrangement has naturally been governed by the constructive lines of the old building which, as far as possible, have been utilized. A comparison of the elevation of the old house with the new will clearly convey the improvements that have been made. The finishings of the dining-room are in oak, the drawing-room in American walnut, the library, morning-room, billiard-room and staircase-hall of pitch-pine. These rooms have open-timbered ceilings with moulded ribs and sunk panels. The dining-room walls are panelled in oak, and like the other entertaining rooms have ornamental wood chimney-pieces and overmantels in harmonious combination with tiles and marble. Between the large and smaller drawing-rooms there is a highly ornamental screen in American walnut, and round the fireplace other ornamental screenwork forming an ingle-nook with settees tastefully upholstered. The small divisions in the upper part of the windows in the principal elevations are filled with delicately-tinted lead lights. The glazing of the entrance-doors, internal screens, staircase-hall windows and other portions are entirely filled with richly-tinted glass in leaded patterns. The main roofs and roof of the veranda extending round three sides of the house are covered with red tiles, which, in combination with the half-timbered work and lattice-work on walls and in window-shutters, form a pleasing effect of color in the midst of the rich foliage around the house. Throughout the building quaint features meet the eye, from the redstone and half-timbered porch to the mullioned windows of the attics, which command one of the finest views in North Wales, embracing the village of Trefriew and the picturesque gorge leading far away into the lofty mountains beyond.

FAILSWORTH CONSERVATIVE CLUB, MANCHESTER, ENG. MR. CHARLES T. TAYLOR, A. R. I. B. A., ARCHITECT, OLDHAM, ENG.

THE new club at Failsworth, Manchester, occupies a frontage of sixty-two feet six inches, the principal entrance facing the main road, the various rooms being situated on each side. On passing through the vestibule and entrance-hall the billiard-room stands on the left, and has windows both on the front and towards Princess Street. This room is thirty feet long and twenty-five feet six inches wide, and is capable of holding two tables. The bar adjoins the billiard-room and card-room, and is also separated from the entrance-hall by glazed sliding sashes; the lavatories are adjacent to the billiard-room. The reading-room, which is a well-lighted room, stands on the right of the entrance. Leading from the entrance-hall there is a members' staircase for access to assembly-hall upstairs, which extends the whole width of frontage. There is also a public entrance to the assembly-hall in Princess Street, which would allow that room to be used for public meetings, entertainments, assemblies, etc., without interfering with other parts of the club. Close to the landing of public staircase are two committee-rooms which, when the assembly-hall is in use, would serve as retiring-rooms — one for ladies and one for gentlemen, the former having lavatory accommodation. There is also on this floor a larger committee-room

which could be used for serving refreshments. From Princess Street access is gained to the caretaker's house, which consists of kitchen and scullery on ground-floor, which are both in direct communication with bar; two bedrooms are on the second floor. By means of a private staircase the caretaker has access to any portion of the premises. The basement contains heating-chamber, fuel-cellar and ample accommodation for storage of refreshments. The building is faced with Accrington bricks on two principal elevations, and is freely interspersed with stone and red Ruabon terra-cotta dressings. The principal inside doors and assembly-room roof principals are of varnished pitch-pine, the remaining joiner's work being of St. John's pine stained and varnished. The lavatory and entrance floors are tiled. Stained lead lights are freely used in a portion of the windows, bar front, lavatory and vestibule screens, etc.

DOCTOR'S HOUSE, OLDHAM, ENG. MR. CHARLES T. TAYLOR, A. R. I. B. A., ARCHITECT, OLDHAM, ENG.

The accommodation provided on ground-floor of the building illustrated consists of vestibule, entrance-hall, drawing and dining rooms, kitchen and pantry, also waiting-room, consulting-room and dispensary *en suite*, the latter being fitted with special fittings as required by medical gentlemen; all the three latter rooms are entirely separated from remaining parts of house, there being also a separate entrance to the waiting-room from front street for use of patients. From the hall the staircase gives access to upper floor, which consists of six bedrooms, linen-closet, bath-room and water-closet. In basement there is extensive cellaring consisting of wash-house, fuel-store, larder and general stores, etc., the former having a separate entrance into back garden; the usual outbuildings are provided. The front is faced with red Ruabon bricks finished with red terra-cotta and stone dressings; upper portion of front gable is formed of half-timber framing with cusped panels, the latter being filled-in with cement and finished cream color.

NOTES AND CLIPPINGS

Smokeless Coal. — John B. Clements of the Christy Fire-clay Company has secured an option on 6,000 acres of coal land in the Ouchita River district in Arkansas, which may go far toward solving the smoke question. It is what is known as smokeless coal. It can be burned on the floor in a parlor without giving off any smoke. Mr. Clements has been after the property for some time, and has had the coal tested at the Christy works, the Crystal Plate-glass Works, the Belleville Gas-Works, and other places. A shipment of it is to be received at the St. Louis Sanitary Company's works, to be tested there. The coal is found in a large deposit, the vein being forty-two inches wide. It contains 20 per cent of oil, which has been found to be very valuable in making paint. A bar of iron painted with it has been placed in a fire and submitted to an intense heat without disturbing the paint. It is also claimed that one ton of this coal will produce as much steam as ten tons of that used here. It is also claimed that it is much better for gas than Pittsburgh coal, which is used here entirely. The only question is said to be the expense in placing the coal on the market here. As far as can now be seen it can be mined and placed on the barge at 50 cents a ton, and can be landed here at $3 50 at a good profit. If this proves to be true, it is said Mr. Clements has something better than a gold mine, as the deposit is in inexhaustible supply. — *St. Louis Globe-Democrat.*

The Brass-grinders' Work. — "I've seen a man grind brass with the blood dripping from his nose all day long," said one of Portland's brass and iron dealers the other day. Perhaps no occupation is more injurious to the workingman's health than grinding brass. The air is filled with particles of the emery-wheel and the brass, and they are of course inhaled by the workmen. The result with a novice, and with a veteran when beginning work, is bleeding at the nose and lungs for several days. Then the bleeding stops, the respiratory passages having become apparently cauterized. Whether the flow of blood is simply the result of the irritation of the physical contact of the metallic particles, or whether the brass acts as a poison, we do not know. But certain it is that these brass-grinders are a very short-lived class of men, averaging less than forty years. In the larger cities they are now wearing a protector over the mouth and nose, but those in Portland do not, for no other reason than disinclination to bother with it and disregard of consequences. But why do men engage in this dangerous work? Because they have good wages. They work by the piece, and with plenty to do they can make sometimes $40 a week. It should be added that sometimes the particles of brass pass into the stomach and bowels and cause hemorrhages. — *Portland Transcript.*

The Old Assembly House at Chester, Pa. — Workmen who are tearing down the old Assembly House in Chester, Pa., found the corner-stone of the building in which the first Colonial Assembly of the Province of Pennsylvania met December 4, 1682. William Penn presided a part of that session. The foundations were in a good state of preservation, and showed that the building was 42½ by 50 feet, with an addition 14 by 34 feet. The house was built for a tavern by the Sandeland family prior to 1675. The old house fell down nearly a century ago, and the foundations were forgotten until they were uncovered last week — *New York Times.*

Monument to Louis Favre. — Few of those who travel now in comfort through the long St. Gothard Tunnel give one thought to men whose lives were unselfishly sacrificed in that great effort of engineering skill whose result is that tunnel. Recently we were reminded of him to whose persistence under the most awful difficulties, the convenience and comfort of modern Italian tourists is due. At Chêne-Bourg, in the Canton of Geneva, the monument of Louis Favre was unveiled in the presence of President Schenk and other leaders of the Swiss people. He has been dead but fourteen years, so that his memory still survived among all the speakers who unanimously eulogized him there. Louis de Favre started as a common workingman, but by his enterprise, resolution and skill raised himself to such a high position. He lost in his great undertaking, not only his fortune, but his life, dying in the tunnel his fame was made in, in the execution of his duty. The characteristic of the observance was, as M. Didier said, "homage paid to work, energy and perseverance." — *Berne Correspondence, London Standard.*

Dead Men for a New Bridge. — At Brazcka, in Bosnia, an old superstition has come to life again which resembles the fables of Jewish ritual murders. In Bosnia the people have believed at all times that a bridge could not be firm and lasting unless a human being was walled up in it. Thus there is a legend connected with the handsome Roman bridge at Mostar, which says that the fine arch across the Narenta could not be finished until the architect walled up in it a bridal pair. Now that a solid bridge is being built across the Save at Brazcka, this superstition is revived. It is rumored everywhere that gipsies are stealing children to sell them to the contractors, who wall one up in each pillar. A few days ago there was a regular pursuit of some unlucky gipsies, of whom it had been said that they were raiding for children. — *London Daily News.*

A Flag to summon to Church. — In the rooms of the Connecticut Historical Society is exhibited a piece of a bell showing the date of casting, 1729. This fragment, which is in two parts, is a portion of the bell which formerly hung for more than a century in the old Centre Church. The old bell having broken in 1725, the society, on December 19, 1726, voted "that Mr. John Edwards, at the charge of the Society, purchase some Suitable Red bunting for a flagg to be Set on the State House to direct for meeting upon the publick Worship of God." The old bell was sent to England at the expense of both the First and Second Societies, where it was recast in 1729, and continued in use here from that time until 1841, when it broke, and a new bell was ordered. — *Hartford Courant.*

The Shot-drill. — In the shot process of drilling through rock, steel shot are poured inside the drill pipe into a ring or channel made in the rock by a few revolutions of the pipe. The pipe bears on this ring of shot, and when it is revolved it causes the shot to revolve also and cut the channel in the rock deeper. As boring large holes through hard rock by means of diamonds (which are now costing from three to four times as much as they did a few years ago) is very expensive work, the new process of drilling by means of steel-shot will, it is expected, be used in many cases instead of the diamond-drill. A test boring eight inches in diameter and 390 feet deep, was recently put down by the National Boring and Drilling Company, which owns this process. — *Invention.*

The Reclamation of the Mojave Desert. — The reclamation of 200,000 acres of the Mojave desert is one of the most stupendous enterprises ever undertaken in Southern California, and from the indications the project will go through. The plan is to irrigate the large acreage near the mining town of Victor, in San Bernardino County, this side of the Needles. The company having the project under consideration is the Victor Irrigation Company. Some of the best engineers of the State have reported upon the enterprise as a most favorable one and very feasible. It is understood that the lands thus irrigated will be colonized, when that part of the desert may be expected to blossom as the rose. — *Los Angeles Herald.*

The Antiquity of Canned Fruit. — *The American Druggist* says that we are indebted to Pompeii for the great industry of canned fruit. Years ago, when the excavations were just beginning, a party of Cincinnatians found in what had been the pantry of the house many jars of preserved figs. One was opened and they were found to be fresh and good. Investigation showed that the figs had been put into jars in a heated state, an aperture left for the steam to escape, and then sealed with wax. The hint was taken, and the next year fruit canning was introduced into the United States, the process being identical with that in vogue at Pompeii twenty centuries ago.

Bridge across the Bosphorus. — The building of a gigantic bridge at Constantinople has long been under contemplation, with the view of connecting European Turkey with Asia Minor by rail. The latest scheme is that the structure should span the Bosphorus a little to the east of the metropolis, approximately midway between the Golden Horn and the western extremity of the Black Sea. At this point the strait narrows considerably, but even there the passageway would require to be some 2,660 metres in length, or nearly as long as the Forth Bridge. — *Invention.*

A Foundation Pier built over a Well. — Workmen about to build a brick pier for a new building in Lewiston, Me., dug down four feet into the ground and came upon a large flat stone. It pleased them to discover what they believed would be a fine foundation for their pier, and they went to work building upon it. They built the pier to a height of twelve feet, and then were astonished to see it sink into the earth. Investigation showed that their flat foundation stone covered the top of an old well 30 feet deep. — *New York Times.*

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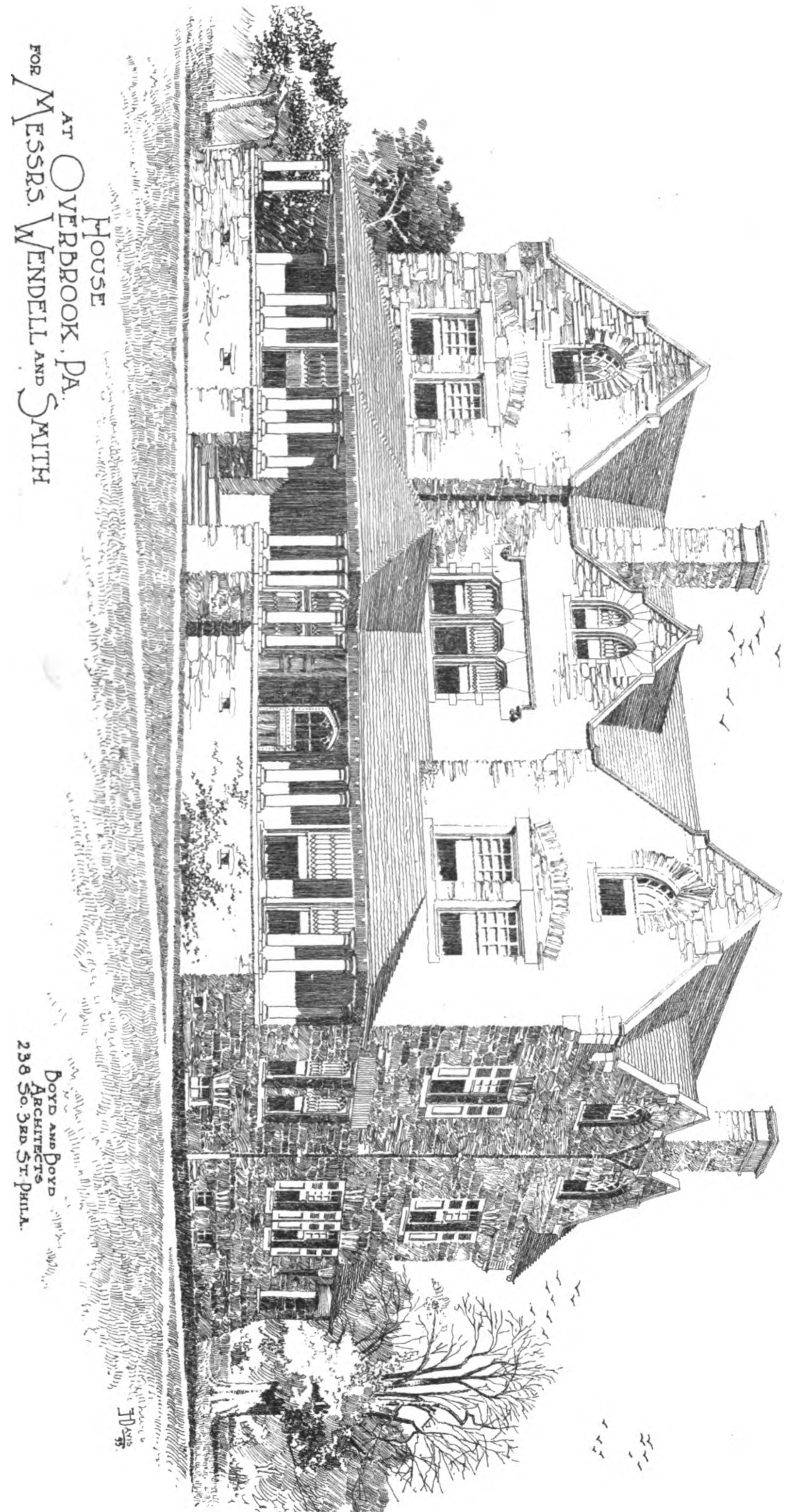
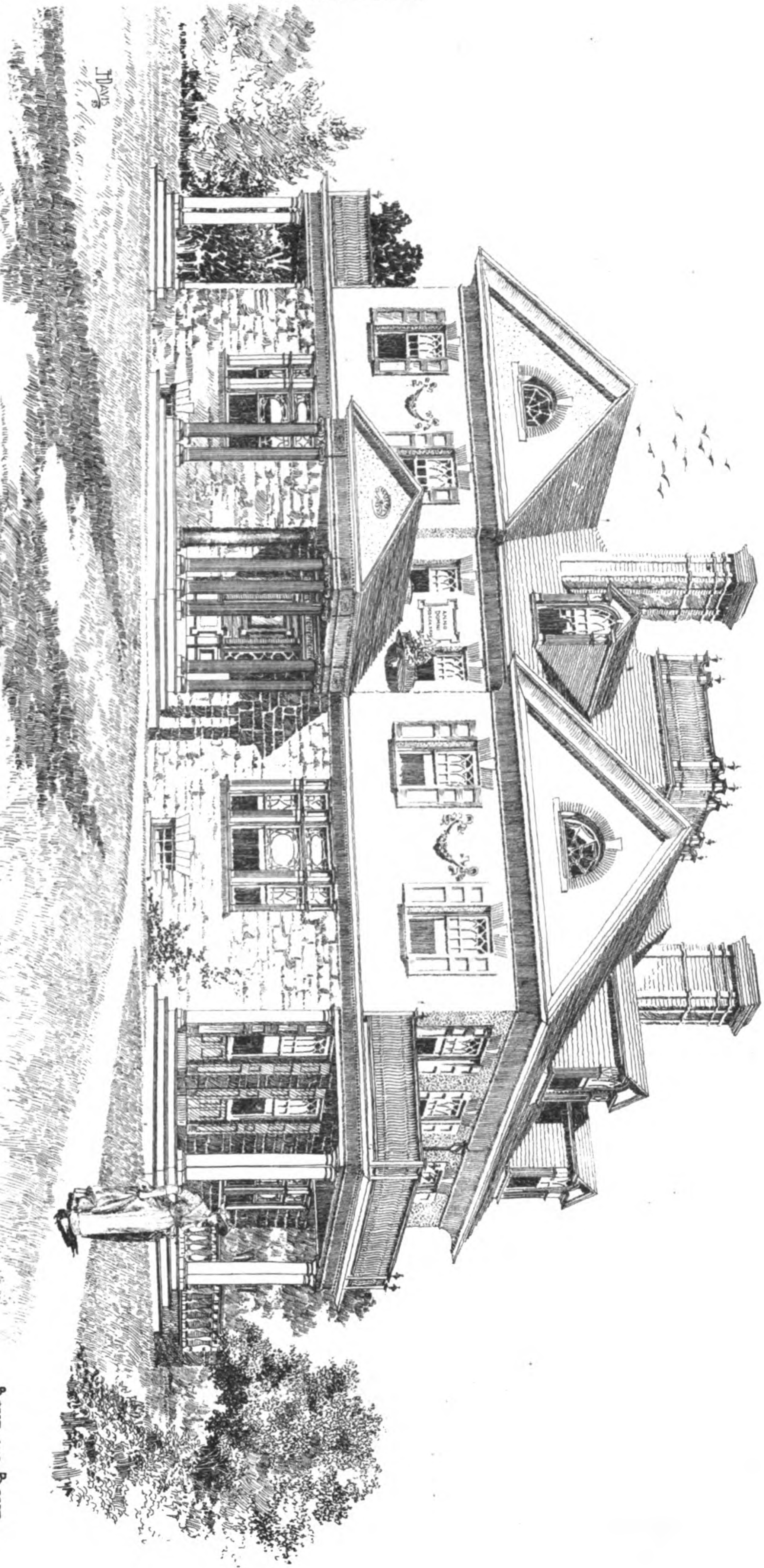
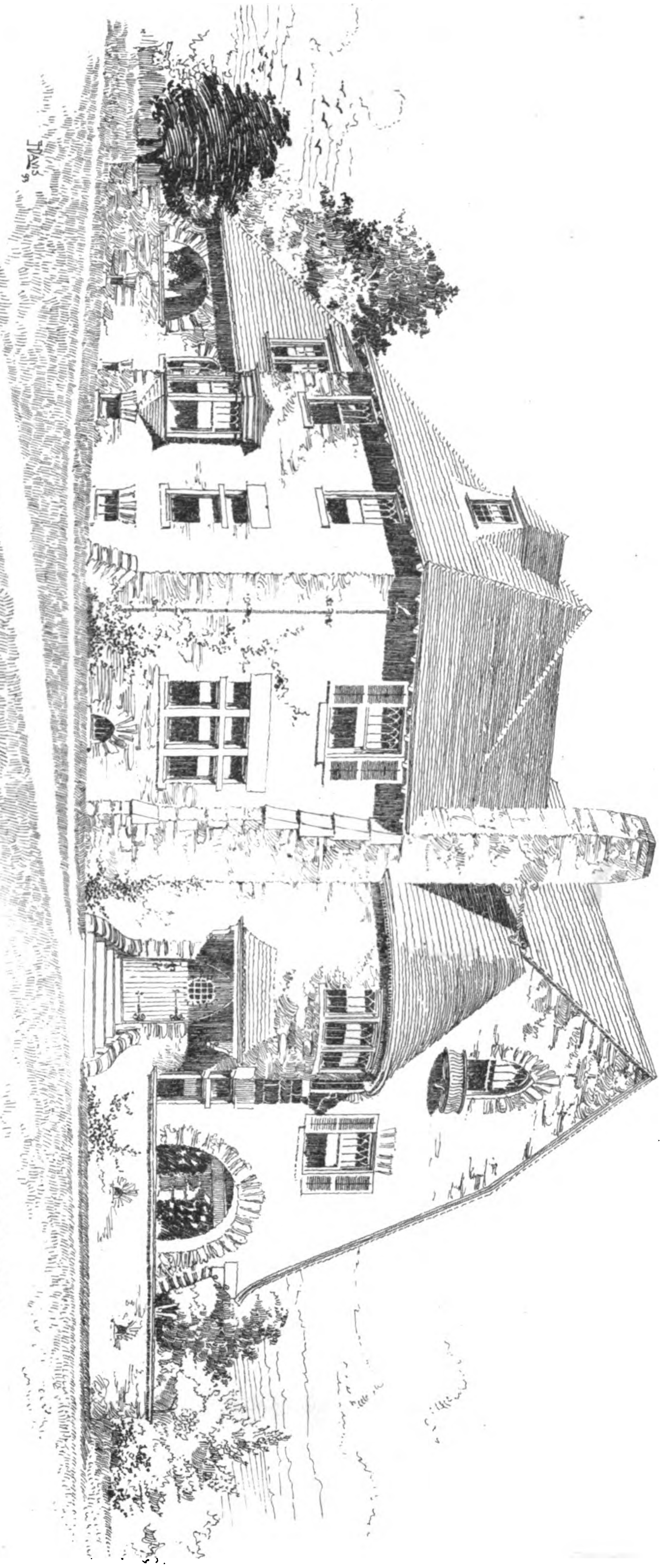




HOUSE AT OVERBROOK PA. FOR MESSRS WENDELL AND SMITH

BOYD AND BOYD ARCHITECTS 238 SO. 3RD. ST. PHILA.



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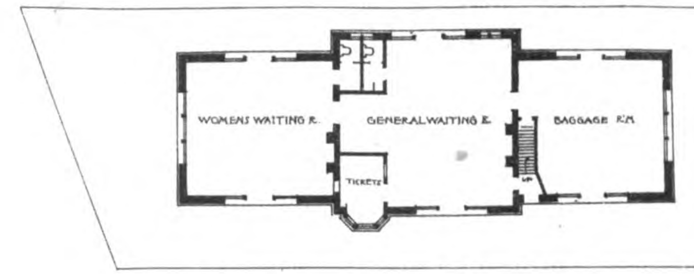

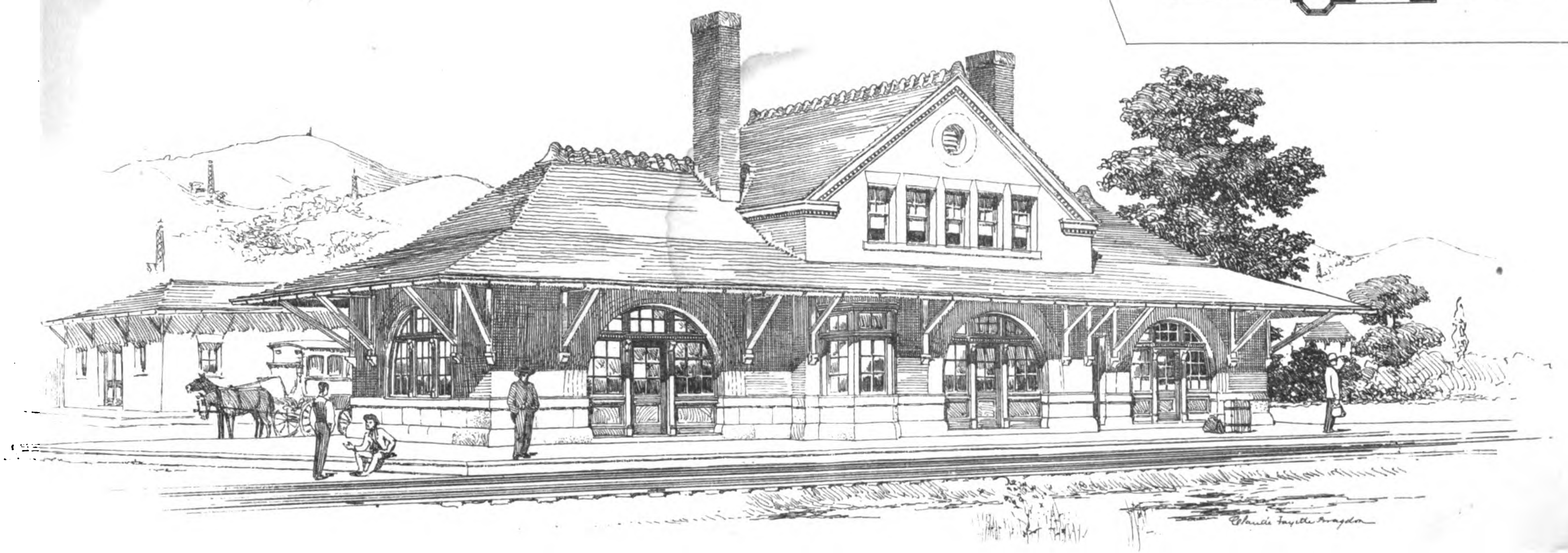

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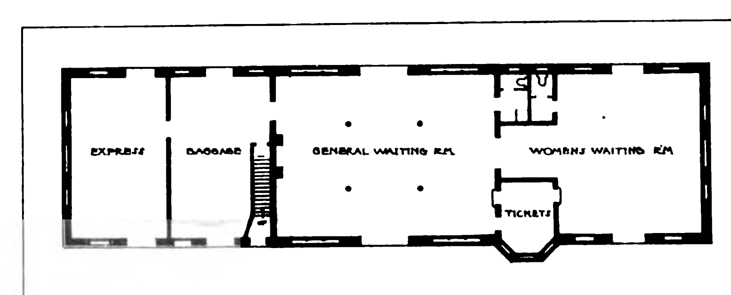

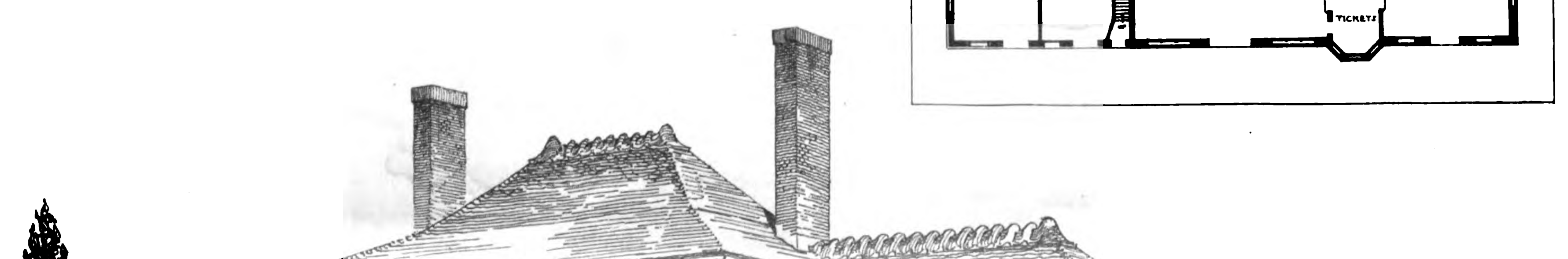

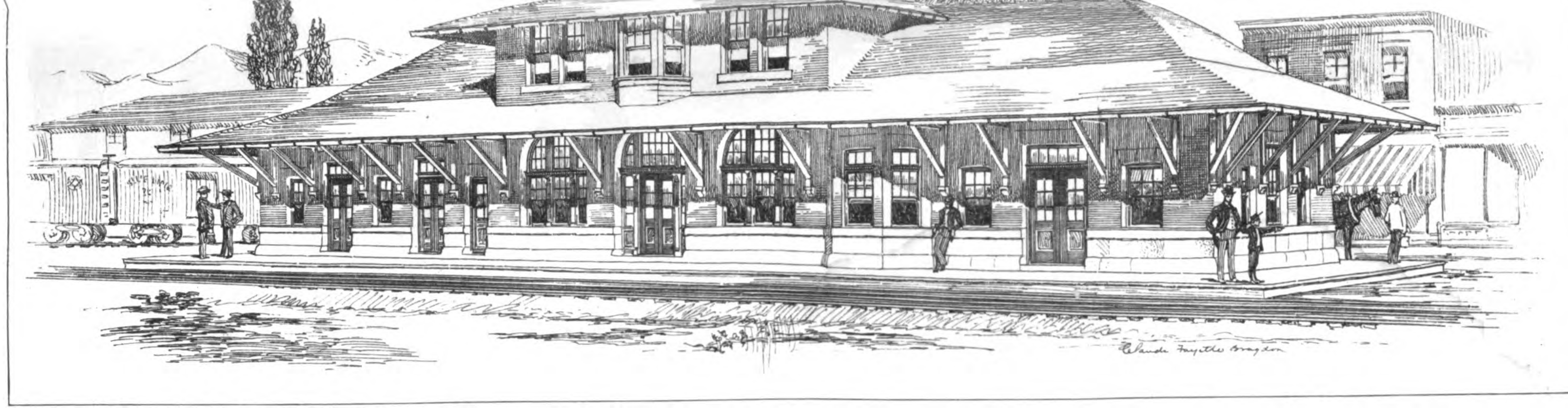

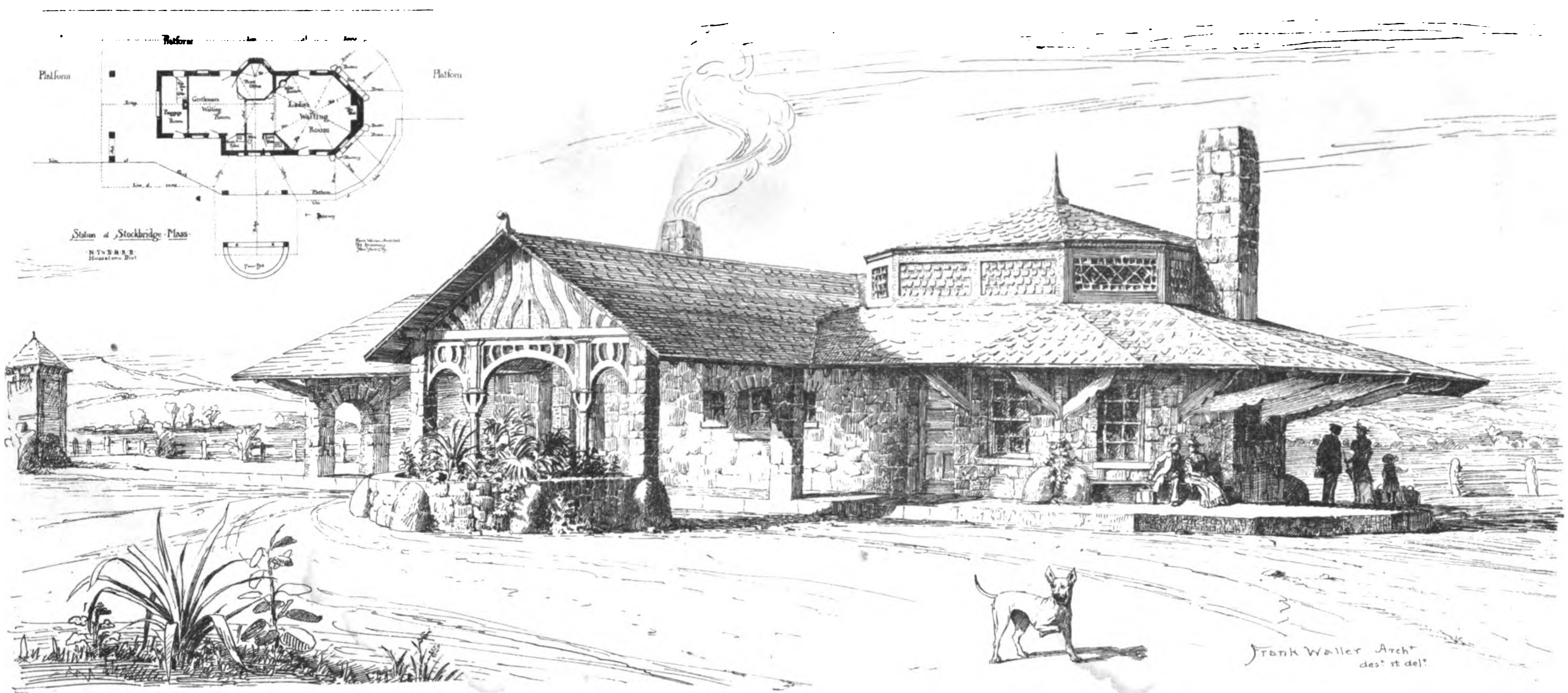

STATION AT STOCKBRIDGE MASS. HOUSATONIC RAILROAD.

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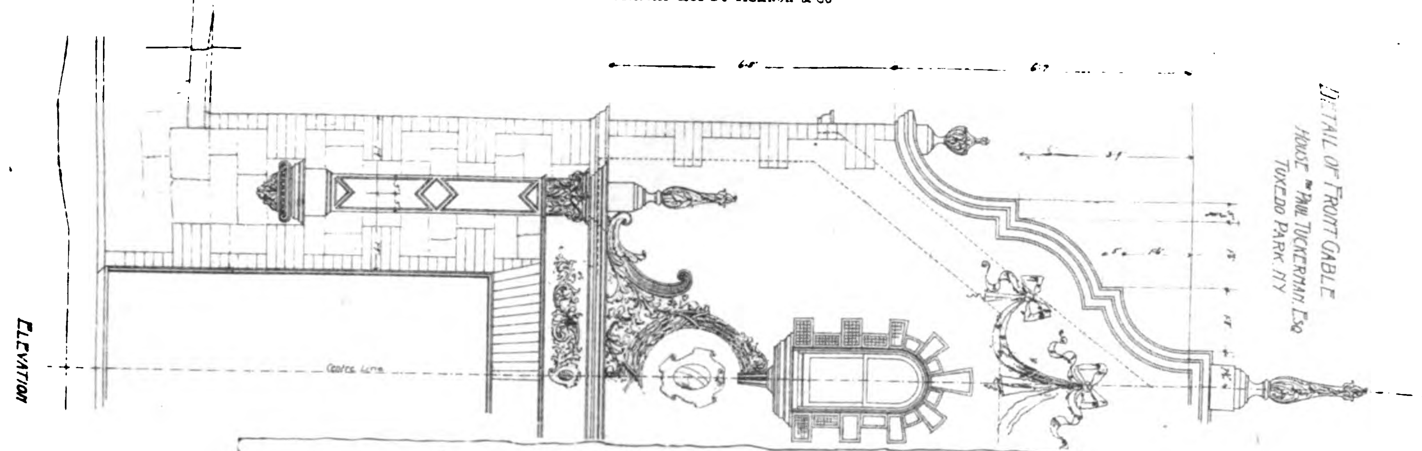

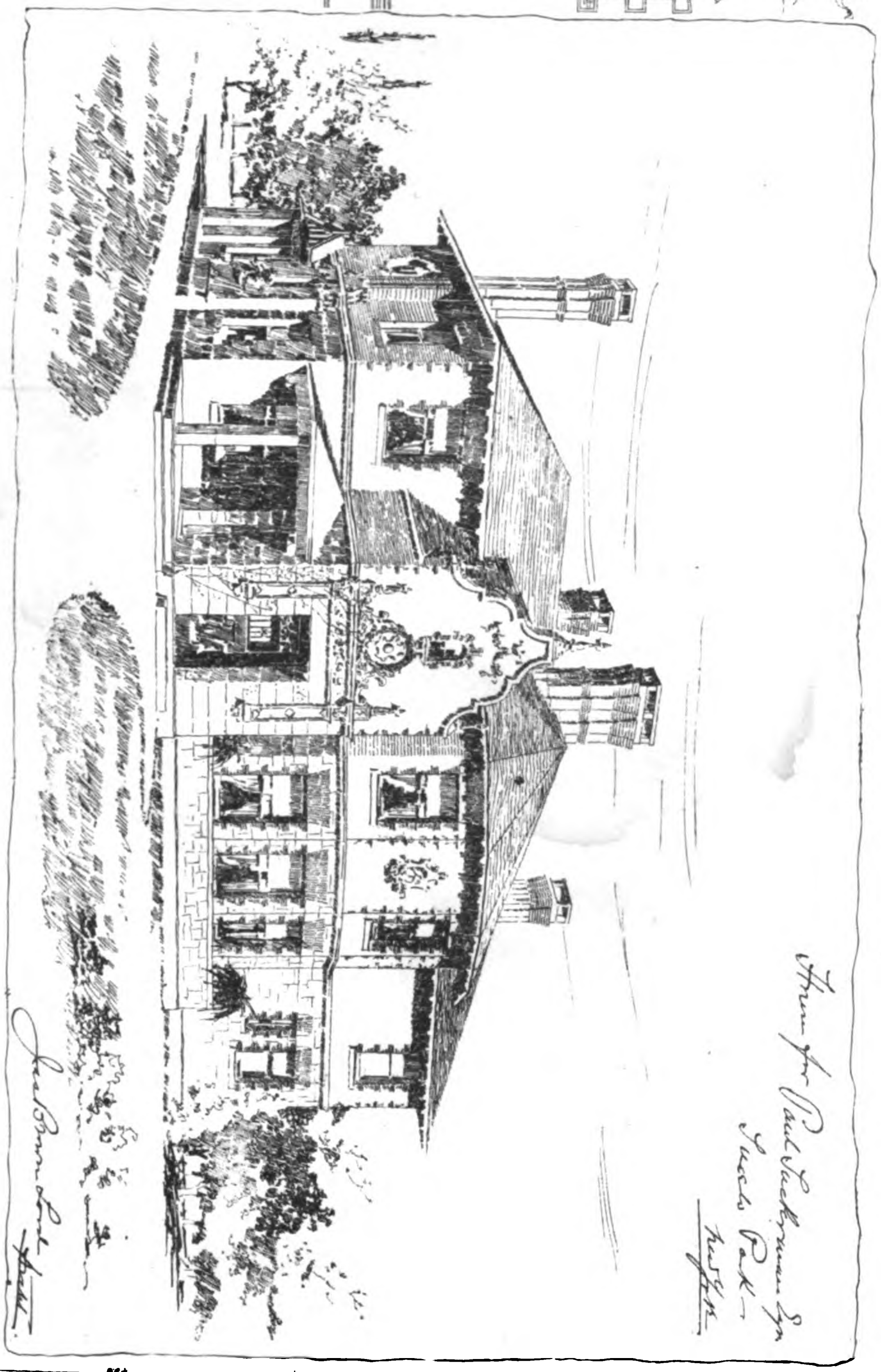

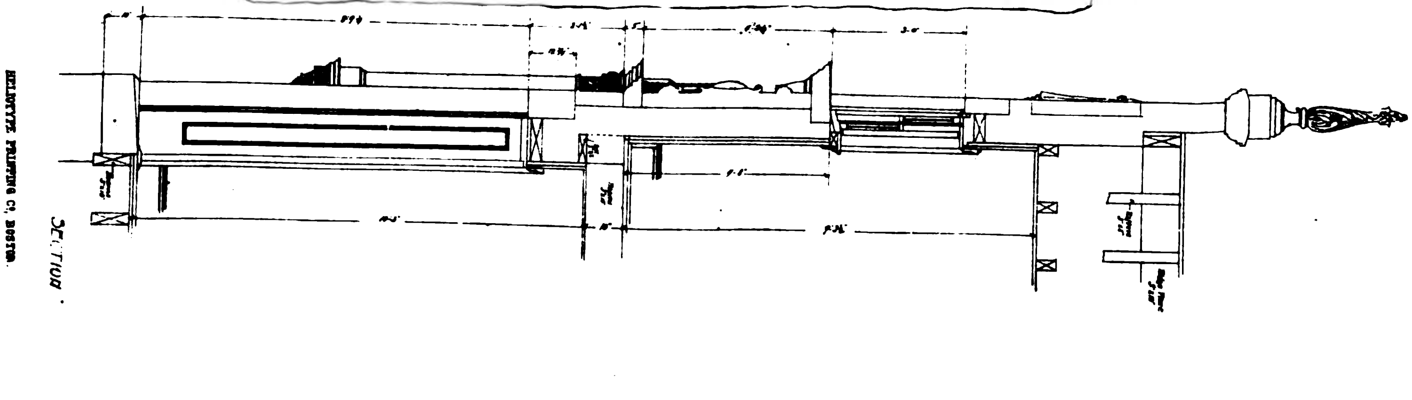

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SEPTEMBER 30, 1893.

CONTENTS

THE Providence *Journal* observes that, judging from the statistics of the past seven months, the fire-loss of this year in the United States will exceed that of last year, which was one hundred and fifty-two million dollars. The cost of keeping up fire-departments, and of paying salaries and commissions to insurance officials and agents, is at least as much more, so that we may safely say that this country now spends half a million dollars a day, not counting Sundays, on the national ash-heap. We have before pointed out that the annual cost of American fires was greater than that of supporting the armies of Germany and France combined, but this year we shall have done still better, and the expense of our ash-heap will be greater than the cost of maintaining not only the armies, but the navies, of the two greatest Continental powers. More than this, it appears that the shiftless and foolish waste, on which we lavish annually more money than is required to maintain the military power of the two strongest nations in the world, costs us lives as well as treasure. In six years, from 1883 to 1888, nearly three thousand persons lost their lives by fire in the United States. The average number has probably increased since then, but no subsequent statistics have been prepared, so that the present rate is not known. However, even at five hundred violent deaths a year, it costs us more lives to hold at bay the fire-fiend whom we so recklessly invite than it does Russia to conquer Central Asia. There is some comfort in finding that, so far as sacrifice of life by fire is concerned, Great Britain surpasses us. In England and Wales, the average annual number of persons who meet death from fire is, we are told, fifteen hundred. It may be observed that this statement rests on the authority of the Providence *Journal*, but, whether we accept it as accurate or not, it may be taken for granted that the loss of life as well as property, both here and in Great Britain, is much larger than it should be. The remedy is very simple. If all houses were made so that they could not burn, persons and property in them would be nearly safe, and could be made entirely so by suitable subdivision of the space in them. To make houses that will not burn, incombustible materials, and only such materials, must be used, and there is no reason why the use of combustible, and therefore dangerous, building materials should be permitted in any country. It is true that a house of iron and brick is expensive, but the proper remedy for this is to find means of reducing the cost of the iron and brick, not to abandon them and use wood. There is no reason why iron beams, suitable for dwelling-houses, should not be sold in all our large cities for a cent a pound; and bricks can be sold at a profit for three dollars a thousand, where they are made under modern conditions of economy. At these prices, the difference in cost between a fireproof building and a wooden tinder-box is not very great, and the details of incombustible construction are being rapidly cheapened and simplified by our architects, so that, with a little legislative help, we might hope to see, even before the end of the century, the definitive abandonment of wood as a material of construction in American cities.

LE GENIE CIVIL makes some sensible remarks about the "summer exodus," as it is called here, which takes the well-to-do inhabitants of the cities for a shorter or longer time into the country during the hot season. Where the city family can spend its vacation far out in the country, among mountains and green fields, or in some unfashionable and lonely spot on the seashore, it will be the better for the change; but to great numbers of city people, instead of rest and fresh air, their holiday, spent in a crowded summer-resort, brings nothing but discomfort and fatigue, with the added evil effects, in most cases, of bad air, bad water and bad food. To all these things people expose themselves at the most dangerous season of the year, when the vital forces are reduced by the summer heat, and, to make matters worse, the pleasant excitement of change of scene, with, often, a polite reluctance to complain, makes people overlook warning symptoms which would justly alarm them at home. The consequence is that hundreds, perhaps thousands of families, every year pay the penalty of their summer's exposure to unwholesome influences in the severe illness, if not the death, of one or more of their members. To avoid such consequences, those who propose to spend a part of the hot season away from home should bear constantly in mind certain principles of hygiene. In the first place, if the resources of the family do not permit them to spend their vacation in comfort, with as good rooms and good food as they would have at home, they had much better not go away at all. A house or apartment, even in the hot city, with plenty of pure water for drinking and bathing, is safer than the wretched accommodations of crowded seashore resorts. If the necessary time and money can be spared, it is best to go far away from the city, entirely out of the reach of crowds and microbes. There are plenty of places, unfashionable and almost unknown, where the air and water are pure, and comfort and elbow-room can be had at a reasonable price. These are the places in which tired city people can rest and refresh body and mind, and, although they cannot always be found without some trouble, this trouble must be taken, if necessary, rather than risk the lives of a family in the usual summer-resort.

ANOTHER precaution which should not be overlooked is to acclimate the body gradually to the change of climate and surroundings involved in the summer outing. A man, or, still more, a young person, arriving in the country pale and feeble from overwork or nervous exhaustion, starts at daybreak the next morning, perhaps, for a trout-fishing trip. His circulation is weak from want of exercise, and he is therefore easily chilled, and his digestion is more or less disordered from the same cause. He has one or two hearty companions, and, in imitation of them, wades all day in a mountain torrent, eats an enormous lunch of cold doughnuts, and returns, chilled to the marrow by the night air. The next day he is on the sick list, and remains there until his return to town, fortunate if he recovers then, while, if he had been sensible enough to devote four or five days to accustoming himself gradually to the change of regimen, he might have received lasting benefit from his vacation.

THE *Werkmeister Zeitung* gives some suggestions, from a discourse of Dr. Otto Schluter before the Master Mechanics' Association of Stettin, in regard to the treatment of slight wounds, such as carpenters and other workmen are very subject to. The first direction is to observe the course of nature in treating wounds, and follow with discretion the suggestions to be derived from so doing. It will be noticed that a superficial cut or scratch is accompanied with pain, which induces the injured person to withdraw the part affected from the source of the pain; and thus avoid further damage, and the continuance of the pain leads him to bandage or otherwise care for the distressed member, in such a way as to preserve it from

cold and infection. It will next be observed that the wound bleeds, more or less profusely, according to the amount of injury done to the veins and arteries. The effect of this bleeding, Dr. Schluter informs us, is to wash the wound, and, by means of the outward stream of blood, to prevent injurious germs from effecting an entrance into the circulation. In pursuance of these indications, then, the first thing to be done in case of injury is to wash the wound carefully, after which the limb should be protected by clean bandages, and kept warm and quiet until the process of healing is well advanced. If the injury is not very serious, and the wound has been successfully washed, it will, unless it receives infection from the bandage, begin at once to heal by what the doctors of the last generation used to call the "first intention," the tissues being repaired without important inflammation. If, however, one or more of the microbes of corruption, which are always floating in the air, succeed in effecting a lodgement on the freshly-injured tissue, they will set up a change in the fluids surrounding them, which may have serious consequences, and always delays greatly the cure of the wound. The evidence that infection of this sort has been received is to be found in the swelling and heating of the parts about the wound, which, as the saying is, become "inflamed." The local inflammation is accompanied with more or less general fever, and the injury finally "suppurates," forming a whitish liquid, which, if the course of the cure is favorable, is set free, or absorbed, and the wound at last heals, by the formation of new tissues underneath the portion destroyed by suppuration. The whitish fluid formed during the process of suppuration is, however, of a corrosive and poisonous character, and unless it can escape freely, it will "burrow," as the surgeons say, among the softer tissues, in such a way as sometimes to cause great injury. Dr. Schluter observes that the skin on the hands of workingmen is usually hard and impenetrable, so that the secretion from an inflamed wound cannot easily escape. Under these circumstances, it corrodes its way through the muscles underneath, generally toward the joints, where the tissues are softer than elsewhere, and causes permanent distortion and stiffening there.

THESE things being so, it is obviously of great importance to prevent the germs of infection from reaching the wound, so that inflammation, with all its serious consequences, may be avoided. In hospitals, where severe operations are performed, the risk from this source is very great, and not only is every precaution taken to have the wound carefully washed, and the bandages and operating instruments absolutely clean, but the air surrounding the patient is often kept clear of microbes by a spray of carbolic-acid solution, which destroys the germs which come under its influence. On a smaller scale, it is often advantageous to wash a wound with a weak solution of carbolic acid, containing not over two per cent of acid. Even at this strength, however, carbolic acid is occasionally injurious, and in some hospitals a weak solution of cooking-salt is used instead, while in Vienna, according to Dr. Schluter, a solution of acetate of alumina, of moderate strength, is often employed. If either acetate of alumina, or cooking-salt is used, the solution should be boiled, to destroy the germs present in the water. Bandages must be perfectly clean, and it is advantageous to put on first a soft linen bandage, then a piece of oiled-silk or parchment-paper, and a second bandage on top. The parchment-paper, or other waterproof material, keeps in the moisture of the inner bandage, and prevents it from drying and sticking to the wound. The inner bandage should be renewed, always with the same precautions, twice a day, and if this is carefully done, and the wound has received no previous infection, the process of healing is likely to go on well.

APPARENTLY, the most skilful chemists, as well as the ablest physicians of the universe are the microbes. Pasteur has shown us that benevolent, or, as the *Lancet* would have it, well-trained microbes have the power of defending us from the most terrible infectious diseases, and the Massachusetts Board of Health has obtained photographs from life of the microbe which can do what no human chemist has ever done, that is, oxidize ammonia into nitric acid. Very recently, another microbe has been discovered, who also practises chemistry, his special branch being the formation of citric acid from glucose. It is not many years since one of the stock wonders of chemistry was the conversion of starch, potatoes and similar substances into uncrystallizable sugar, or glucose, by the action of sulphuric acid, but this tiny organism, which shows itself in a green, felt-like skin over the surface of the liquid undergoing its action, converts glucose itself into pure citric acid, carbonic acid being disengaged. We have thus, by making friends with the "citromycetes," as their discoverer, M. Charles Wehmer, calls them, the means of extracting both lemon juice and sugar from potatoes, corn and many other cheap vegetable substances. This discovery may have a possible practical value to shipmasters on whaling or other long voyages whose supplies of scurvy-preventing lime-juice may have given out or been accidentally destroyed.

A CERTAIN experimenter has been trying the comparative effect of various sorts of decoration upon the lighting of rooms. Taking a room hung with black cloth, he illuminated it with one hundred candles, and then counted the number of candles necessary to bring rooms decorated in other ways to the same degree of illumination. He found in this way that a room with a dark brown paper required eighty-seven candles to make it as light as the black cloth one with a hundred; a room with blue paper took seventy-two candles, and one with a pale yellow paper required sixty. A room lined with panel-work, either in natural wood, or in white paint, needed fifty candles; one with dirty panelling required eighty, and a room with plain, whitewashed walls took only fifteen.

A CASE was decided in France the other day, which has a considerable interest for railway travellers. The plaintiff took a train at Asnières for Paris. The train, according to the official time-table, should have left Asnières at 8.12, and was due in Paris at 8.20. In fact, it did not arrive in Paris until 8.53, a delay of thirty-three minutes. The plaintiff, in order to meet an important business engagement, was obliged to hire a carriage at the Paris station, and pay two francs for the conveyance to his destination; and he subsequently brought suit against the railway company, to recover these two francs, and five hundred more, which he claimed as general damages. The company resisted the claim, on the ground that, although it acknowledged the delay to be due to the fault of its servants, the plaintiff had not proved any real damage, and that, even if the damage claimed had been proved, the company would not be responsible, inasmuch as it had not been previously notified that it would incur the risk of extraordinary damages if it transported the plaintiff. The court held, in regard to the claim for two francs carriage-hire, that this was a just demand on the part of the plaintiff, and that the company must pay it. The claim of five hundred francs, however, it could find no ground for allowing. As the defendant company would have to pay the expenses of the suit, the plaintiff would not need the money for this purpose, and he had not shown any other damage requiring such indemnity. It therefore rejected this claim, allowing the plaintiff only his two francs, but condemning the company to pay all costs and expenses.

IT is unusually noticeable this year that a considerable number of the most prominent students of architecture in the Paris School of Fine-Arts bear surnames already distinguished in the profession. Thus, among the ten "*logistes*," or competitors for the Prize of Rome of this year, no less than three, MM. Deperthes, Varcollier and Letrosne, appear as pupils of architects of the same name, well-known to fame, and there are many other examples in the lists of the winners of the school "*recompenses*." Undoubtedly, this indicates that it is common in France for the sons of architects, particularly of the more noted ones, to adopt their fathers' profession, as it is also in England, where the younger Barry, Scott, Street, Waterhouse, Blomfield and others pursue with signal success the family calling. Although there are many exceptions, it is still almost the rule that it takes at least two generations of training to develop a great artist. Nothing is more common than to read, in the "*Lives of the Painters*," that the subject of any particular biography was the son of another artist; and the greatest musicians have generally been brought up from childhood in a musical atmosphere. Whether this inherited inclination is of so much value in an abstract art like architecture as in music and painting remains to be seen, but there seems to be no reason why it should not be.

APSES.[1] — II.

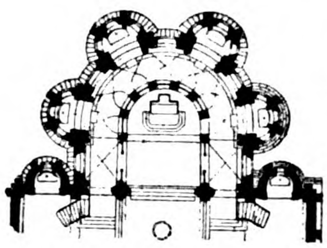


Fig. 15. Plan of the Apse of the Church of Orcival (Puy-de-Dôme.)

IN the twelfth-century Romanesque edifices of Auvergne, a deambulatory, or side-aisle extending around the choir, frequently occurs, bringing into use a constructional system to which the architects of the period devoted persistent study; the art of the following century reaped the advantage of this in the complicated combination of the vaults over the deambulatories and the planning of the radiating chapels. Even in the Romanesque era, this system, although less developed, furnishes a very interesting subject for investigation, as will appear from a study of the plan of the church of Orcival (Puy-de-Dôme, see Fig. 15). The illustration shows the projection of the groined vaults, and indicates the difficulty to be overcome in establishing them, on account of the difference in the spacings, which vary with the position of the choir columns and the opening of the apsidal chapels. Builders succeeded in surmounting these obstacles only after numerous attempts, which the student will find it profitable to follow by comparing the divers constructions of the time; notwithstanding some imperfections of details — notably in the summers — which were skilfully corrected later, the artistic merits and impressive effect of these Romanesque apses cannot be gainsaid; several of them are very remarkable, particularly that of the church of Issoire (Puy-de-Dôme, see Fig. 16). By the aid of this exterior view we can readily reproduce the plan disposition, which is strikingly like that of the Orcival church; we must, nevertheless, take into account this difference: at the centre of the apse at Issoire there is a rectangular chapel. In our illustration, one is struck with the frank and ingenious way in which all the divisions of the general composition are marked on the outside: in the centre rises the choir, of circular form; the deambulatory is designated by the apertures between the radiating chapels, by which it is directly lighted; each chapel stands out by itself and supports its independent roof, above which, to admit of its upward development, rises a gable, the prolongation of which penetrates the roofing of the circular side-aisle; lastly, in the rear of the rounded part of the choir, appears the gable separating the latter from the straight part, and the whole abuts against the wall of the tran-

Fig. 16. Apse of the Church of Issoire.

sept, which is flanked at its base by other apsidal chapels, and which is surmounted by a polygonal tower. Surely, it would be difficult to unite so many different elements with more apparent order and with a better general effect; the conception, which is by no means unique in Romanesque architecture, is therefore full of instruction for the architect, and a fertile subject for his study.

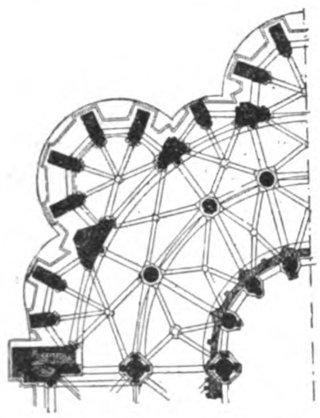


Fig. 17. Plan of the Apse of the Cathedral of Chartres.

In the thirteenth century, the deambulatory was almost universally introduced into churches with any pretensions to importance; but in Burgundy particularly, notably in the Cathedral of Sens, a single chapel was disposed in the axis of the church. Afterwards, radiating chapels were ranged quite around the apse, or a certain space was left between them, as at the Cathedral of Le Mans, where the chapels were carried out a great distance; because of this depth, which brought the light far from the deambulatory, openings were contrived in the wall of the latter between the chapels; at Chartres (Fig. 17), where the encircling side-aisle is double, the chapels are farther apart and the windows of the deambulatory are not in the wall itself, but in a small, scarcely projecting apse; light is therefore very abundant in this choir. The constructors of the thirteenth century were not slow in finding a solution which provided for the free admission of light, and at the same time made it possible to have numerous chapels corresponding to the division by bays of the deambulatory, as well as to those of the choir openings.

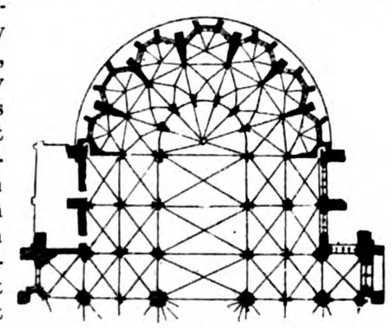


Fig. 18. Plan of the Apse of the Cathedral of Beauvais.

Given the disposition henceforth adopted without exception

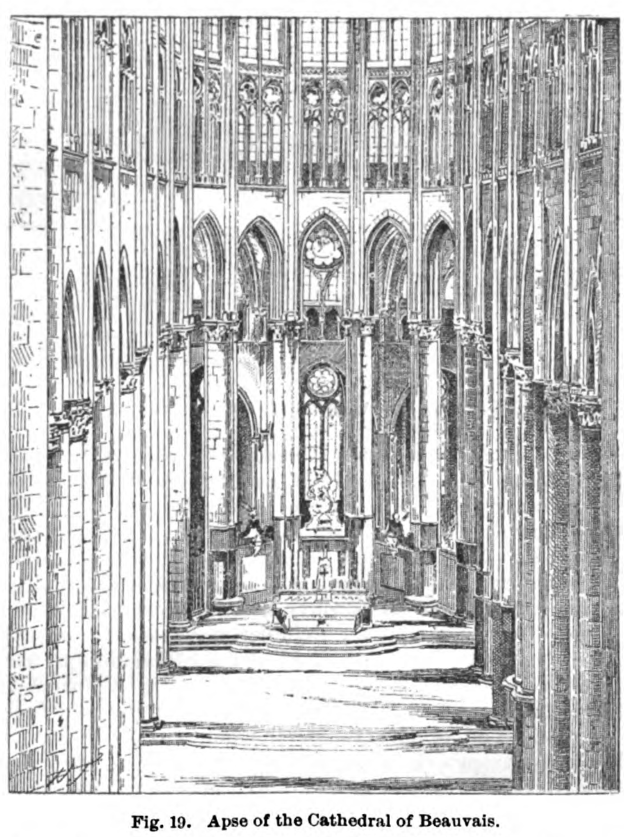


Fig. 19. Apse of the Cathedral of Beauvais.

— large bays surrounded by stone windows designed for glass — and the original circular form of the choir had to be abandoned. As it was impossible to establish such windows on

[1] From the French of A. de Baudot, in Planat's *Encyclopédie de l'Architecture et de la Construction.* Continued from No. 925, page 165.

curved surfaces, recourse was had to polygonal plans for terminating the central aisles at right angles to the choir, and thereafter the general disposition of deambulatories and radiating chapels was materially modified in favor of that form of vaulting the summers of which could be very frankly traced and constructed; moreover, the use of projecting groin-ribs, which constitute the ogival vault, singularly aided in the solution, and, on the other hand, brought great relief by the creation of these remarkable compositions of apses. The example given in Figure 18 reproduces the plan of the choir of the Cathedral of Beauvais; like that in the Cathedral of Cologne, which it strongly resembles, it may be considered as the highest conception to which ogival art could attain in this respect. No more hesitation, no more groping; the trace is perfect at every point; the harmony between the various parts of the apse is complete. The wondrous merit of the choir of Beauvais, which soars to a height of more than forty-five metres beneath the key of the vault, is not, however, limited to the remarkable disposition of the plan. This very rational construction is the logical outgrowth of the principles laid down and developed with so much art by Gothic architects, and it would be impossible to advance farther in the path of boldness.

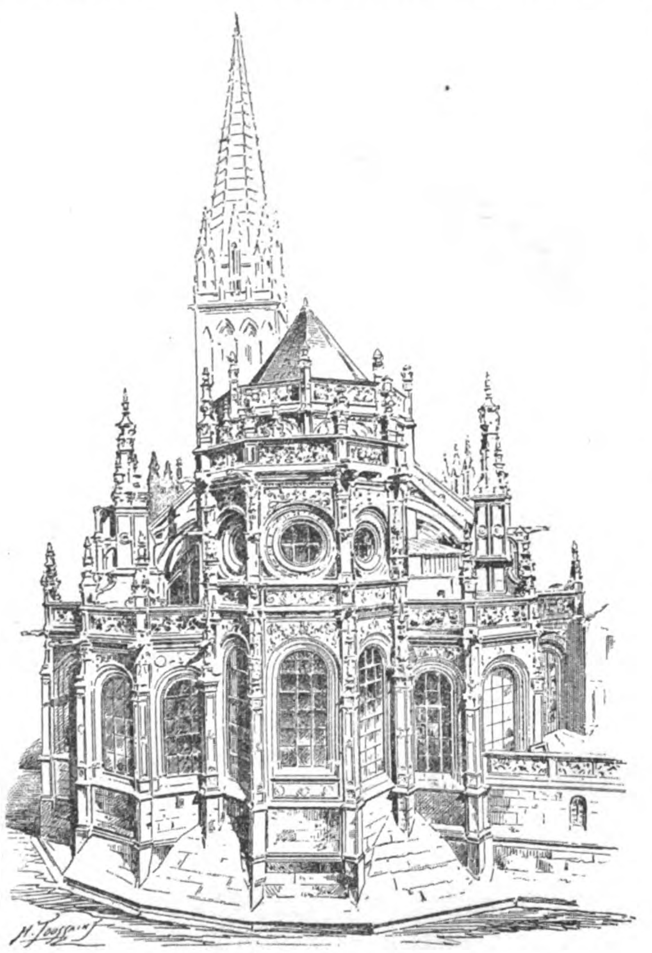


Fig. 20. Apse of St. Peter's, at Caen.

This vast choir, which awes the beholder without inspiring the slightest timidity, has stood for centuries, and it bears to-day the guaranty of a long existence in the future: it is true that in the fourteenth century, or shortly after its construction, it had to be slightly modified by the insertion of piers, dividing into two sections each of the right-hand bays of the choir; this addition, which was so adroitly accomplished that it escapes the eye of every one but an architect, was necessary on account of the character of the soil, and because of some imperfections in the execution of the work, which was greatly hurried; but all this does not affect the merits of the conception, which, had it been realized under more favorable conditions, would have been absolutely irreproachable. The aspect of the edifice is most impressive; this is due not only to the unusual height of the choir, but more especially to the disposition sought in the superimposition of the chapels: there are four open stories, the effect of which obtained from the entrance to the choir is marvellous; the reader will be able to form an idea of it from the interior view shown in Figure 19. The apsidal dispositions of the Middle Ages were preserved in the large churches that were reared during the early Renaissance, and which were quite rare. We must cite especially, as examples of these, Saint Eustache, at Paris, and, as a most interesting apse, that of St. Peter's, at Caen (Fig. 20); this latter is engrafted upon a Gothic church. From the exterior view given here, it is easy to account for the arrangement of the choir and chapels, all traced on a polygonal plan; the radiating chapels are five in number, the central one of which — dedicated, according to an old custom, to the Virgin — is more important than the others simply in its height. This apse, as is readily seen, is an accurate copy in the general plan of mediæval dispositions; the only variation is in the details, and is due to the introduction of the Classic element; yet we discover in the scale of the details and in certain of the forms the entire decorative tradition of French art. In view of the mixture of these two elements, this architectonic composition is of extraordinary value, marking, as it does, the transitional period in a most striking and withal a most interesting manner.

Later, under Louis XIV and Louis XV, a number of churches were erected whose plans were French in their great lines, and in which the influence of the mediæval apse is apparent, as in Saint-Sulpice and the Cathedral of Versailles; but these heavy monuments are devoid of interest as regards constructional method; the vaults have become unnecessarily massive, and those of the deambulatories are nothing more than semicircular barrel-vaults, on which the openings of the chapels are accused in penetrations having a monotonous, commonplace and graceless effect. These edifices, consequently, do not offer a very important subject of study for the architect, although they are sumptuously treated, and sometimes exhibit much talent; they are of interest to us from the place which they occupy in the history of art, but they furnish only a false and feeble interpretation of a period, neither the spirit nor the grandeur of which was understood by their authors.

A. de Baudot.

LIBRARY BUILDINGS.[1]

Fellow Architects and Gentlemen: —

In endeavoring to reach the solution of a problem, its premises must be well understood. This obtains more especially in architectural art on account of the great scope and complexity and resources of that art. As all branches of this art spring from the needs of mankind, the first consideration of design must be that of utility.

Viollet-le-Duc, the great architect and archæologist, says:

"A design, although possessed of artistic merit, may be utterly worthless if there should be wanting the elements of utility and stability."

Mitford says:

"To be good, architecture must be true — true according to the programme of requirements and true according to the methods of construction. To be true according to the programme, is to fulfil with scrupulous exactness all the conditions imposed by necessity; to be true according to the methods and means of construction is to employ materials with due regard for their qualities and capacities. That which is generally regarded as a matter of pure art, viz, symmetry, the apparent form, this is quite a secondary consideration." The design should be the result of ideas evolved from the purpose, method of construction, the nature of the materials employed, and æsthetic reasoning.

Among the most difficult problems an architect can undertake to solve is that of planning a building for library purposes. A library building, like all other structures, is built with reference to certain primary conditions, such as climate, locality, surroundings, directions of the compass, capacity, special use, cost, nature and accessibility of building material.

Therefore, to accept any one plan, whether tested by trial and approved by experience, or still on probation, as an infallible model for imitation under all circumstances, would obviously be a grave error, because there are no two library structures of equal requirement, and each one is erected and equipped under varying and often peculiar conditions and influences.

To imitate specific features of interior arrangements, which have been found acceptable under a contemplated programme, is not only unobjectionable, but sometimes greatly to be desired, because it is impossible to devise for every library new, distinctly different and practical features.

It may not be amiss here to state, by way of digression, as illustrating the point in hand, that one of my principal motives in making a foreign tour for the inspection of the library buildings of the Old World was to see what had been the nature and purport of modern improvements and innovations in library construction. The spirit,

[1] A paper by Mr. J. L. Smithmeyer, F. A. I. A., prepared for the Annual Convention A. I. A., but read at the World's Congress of Architects.

if not the letter, of the law providing for the erection of the Congressional Library at the National Capital, made it incumbent upon me to familiarize myself with the exterior appearance, as well as the internal arrangement, of all notable library structures — to adopt what was good and meritorious and to avoid what was baleful and uncongenial to a more advanced stage of civilization.

The early history of the birth of the library buildings of Europe is not without a special interest, as tending to show how crude was the attempt to inaugurate and bring into popular notice and favor those institutions which have developed from rude beginnings into structures of great architectural beauty, and are the reservoirs and attractive receptacles of commanding intellectual treasures. A large proportion of the great library buildings of Europe were donations of high ecclesiastics, cardinals, bishops, or from kings and nobles of the various States. They were originally their residences and were simply adjusted to their new purposes. Their claim to the consideration of the architect is therefore limited. These buildings, together with the various structures, which were originally built as libraries in the past and in different parts of the Old World, were mostly erected under various (sometimes adverse) circumstances, and in periods gone by which, intellectually and otherwise, vastly differed from each other and from ours. They, therefore, did not bear much resemblance to each other, either in interior arrangement, or exterior design. The contingencies of wars and other great disasters, the want of easy intercourse between nations, together with existing prejudices and superstition, of which the Old World had her share, have greatly added to this diversity. For that reason much good can be obtained by the study of the various (and sometimes novel) devices and characteristics of the individual libraries in way of avoidance as well as in way of adoption.

The variety of these individual devices and characteristics induce the architect to systematize and classify them, and hence we find them divided into three distinct systems and many variations, each of which possesses merit according to the requirements of the case. They are as follows:

1. *Shelf System.* — Well adapted to private and small public libraries (no separate reading-room).
2. *Alcove System.* — Well adapted to public libraries of large size and rapid increase (with or without separate reading-room).
3. *Stack System.* — Well adapted to libraries which have separate book-repositories or magazines and separate reading-rooms.

The dimensions of the *shelves, alcoves* or *stacks* depend upon a variety of conditions, but under no circumstances should the book stories be more than eight (8) feet high, and not more than ten (10) books to be allowed for one foot of book-shelf.

Reverting to our proposition that the imitation of specific features of interior arrangement is sometimes greatly to be desired, it ought to be borne in mind that under no circumstances should there be a modification of or departure from the necessities of a contemplated programme without due reference and deference to *light, comfort* and the *protection* of the books. It is further to be considered that a system of interior arrangements, however commendable in the matter of a private library, may be anything but advantageous for a circulating or college library. So will a system for a parliamentary library be ill-suited to a private collection, and it is certain beyond argument that no system now existing would meet the requirements of the Congressional Library of the United States, now in progress of construction at the National Capital.

It would be useless, if not idle, here to discuss the arrangement of the libraries most renowned, and compare their merits and defects with the requirements of this library, as none, either in the Old or New World, in the past or present, required such a multiplicity of provisions and multifarious arrangements as the Congressional Library at Washington, D. C.

This is partly due to a law of Congress requiring all authors and publishers in the land to deposit two copies of every publication in this library, partly to the rapidly-accumulating articles of the graphic art in the copyright branch in this institution, partly to donations from individuals of large collections, and partly to exchanges, foreign and American; also to the growing documentary stores received from all the States of the Union and from foreign governments, and to the growth from annual purchases of books. It is further due to the great augmentation of periodicals, pamphlets, newspapers, magazines, maps, charts, engravings, color-prints, music, etc., making it really more of a museum of literature, science and art than, strictly speaking, an aggregation of valuable books.

There was necessity for ample provision for the multitude of curiosity-seekers and visitors to all parts of the Library, as well as for the ease, quiet and comfort of the readers and students, and this quietude and comfort was not to be impaired or in any way disturbed.

Ingress on the part of the general public to certain rooms devoted to study is expressly forbidden, but all the other apartments and reading-rooms are free to the passing and re-passing throngs. The grand reading-room may be overlooked from a gallery which is so elevated as to prevent the possibility of annoyance to those below, yet affording to visitors a complete view of their readers and their every environment.

There was necessity also for rooms and apartments for that eminent librarian, Hon. A. R. Spofford, and his host of assistants. Special rooms also had to be provided for those exclusively interested in the domain of science, not forgetting necessary space of commanding importance for the packing, distributing, collating, bibliographing, cataloguing and binding of books.

An attempt to limit the entrance of the American public to the reading-rooms and a few other rooms, wherein the articles of the graphic art are exhibited, to refuse them familiarity with the colossal array of information which the human mind has accumulated and still gathers together in the way of literature, science and art, or to deny them a full insight into the enormous machinery for access to, and the utilization of every part of these intellectual riches, would be regarded, not only as hostile to democratic teachings and the genius of our free institutions (which lay open to the general public every department of the Government buildings, the Capitol and even the home of the Chief Executive) but would be considered disagreeable to and at war with the spirit of the age.

Wide passages and corridors affording the fullest view of all these library treasures are, therefore, everywhere necessary and in every part of the building, and the arrangement of the books is so ordered as to afford absolute protection against theft or injury to them.

It is a noteworthy fact and ought to have place here that all librarians and architects, who have made the study of libraries a specialty, fully approve the locating of the reading-room as near the centre of the structure as possible. The alcove arrangement for the storing of books is universally regarded as the most to be desired, where space and means permit its use and where the method of heating and ventilating is so arranged as to prevent the accumulation of heat in the upper stories of the book-repositories, so detrimental to the preservation of books. By means of the alcove system, the capacity of a library (within its walls) can be more than doubled, if necessary, a feature highly prized in modern libraries with their steady and rapid increase. One of the greatest annoyances experienced by all librarians is the periodical enlargements which these structures have to undergo from time to time, to accommodate the accumulating books.

The management of the library is greatly disturbed and its books much injured by the building operations of new annexes. It is therefore advisable to make all the rooms, especially those which are used as repositories for books, *spacious*, and to arrange them in such a way that they will admit of increased shelving capacity without the erection of new annexes — a contingency which should be postponed till as distant a period as possible.

Light. — The subject of light is of equal importance with all other considerations in the construction of a library building. It is a well-known fact that the effect of light in a room depends, not only upon the quantity admitted, but upon the direction of the light, whether taken from near the horizon, or the zenith; also upon the quality of the glass through which the light penetrates, its condition of cleanliness, the number and thickness of the sash-bars, and other elements of obstruction in the window surfaces, as well as upon various other minor conditions in and outside of the rooms. In order to obtain the best results, light should be obtained from as many openings as circumstances will permit. The more diffused the light becomes in a reading-room, the more agreeable it will be to readers, and the better will be the chances for obtaining good light in every part of the room.

Heating and Ventilation. — What was said about the introduction of light, viz, that it should be obtained from as many openings as circumstances would permit, is equally true of heating. Whether hot air or hot water or steam are used to warm the building is of less import than that either one of them should be connected with a system of ventilation and made inseparable from it. One of the results of experiments and investigations of the laws of hygiene has been the substitution of a newer system of ventilation embodying the advanced principles of hygiene in diametric opposition to the old method.

This system is called the "vacuum" or "down-draught" system, and consists in exhausting (*i. e.* withdrawing) the vitiated air — by means of fans or fires — through openings near or in the floor and allowing the entrance of fresh air through corresponding openings near or through the ceiling. By this method the fresh air, as it enters, distributes itself horizontally and equally, over the room and descends in the ratio in which it is exhausted beneath — from the lower part of the room. In its slow, equal and constant downward movement (not exceeding two cubic feet per second) every space and crevice is filled with fresh air, rendering it impossible for any foul air to remain and be re-inhaled by the occupants, or for any dust particles to rise and settle on the books; and since its downward movement extends slowly and over the entire horizontal cross-section, all draughts are avoided.

The humidity of the incoming air in hot and dry weather and its temperature in summer and winter can be momentarily adjusted and regulated before it enters the room, but the quantity of the incoming fresh air is always the same.

The cardinal features of this system — of great value to library buildings — consists in the simultaneousness of the removal of the impure and the introduction of the pure air, in preventing the dust particles from rising and settling on the books, and in controlling the temperature and the humidity of the incoming air.

Fireproof and Dampproof. — Another point of vast importance in the construction of a library which deserves all the consideration that can be bestowed upon it is the security of the building and its

treasures against destruction from fire or dampness, which are among the most formidable enemies to library buildings and their valuable contents. The destruction of books, etc., by dampness is only a slower process than that engendered by fire, but it is equally as effective and sure. All materials which enter into the construction and equipment of a library building should, therefore, be absolutely non-combustible, so far as possible to counteract the effect of dampness. The various repositories in large library structures should be completely isolated from each other, and the book-shelves so divided by non-combustible partitions, at proper distances, so that each division is protected against the other in case of fire.

Dampness in the present acceptation of the term, refers to the stealthy approach and incursion of the noxious moisture of a gaseous and deleterious nature which emerges from the soil beneath and is called "ground air." This damp atmosphere dissolves the glue in the paper and bindings of the books, discolors, mildews and ultimately decomposes them as well as all old parchments, engravings, etc., and in the end permeates the materials of which the building is composed and prematurely destroys them. This moisture enters all buildings, the temperature of which is higher or the walls of which are dryer than the soil underneath, and many avoidable epidemic diseases are thus engendered. Wherever water does not stand as "ground water," the interstices of the soil are occupied by air, and as the ground water rises, this air is forced up into cellars and basements and becomes, by aspiration, into the warmer and dryer parts above, the air of the structure. The use of cement, asbestos, soapstone, hollow bricks and other materials of that nature, and a thorough drainage of the ground largely reduce the detrimental effects of this moisture, but do not fully obviate them.

By means of a simple and inexpensive contrivance and the use of the same force which brings this ground air from the depths of the ground into our abodes, (according to the laws of nature) we can divert its movement and make it follow the suction created by air-ducts built in the walls for that purpose, which extends from the surface of the ground inside of the structure to the top of this building: thus this moist air will be carried off through these ducts and the walls likewise protected. Of course the cellar, or basement floor, must not rest on the ground, but be placed a few feet above the soil, thus forming an air-chamber, as it were, into which this ground air is sucked by the warmth of the building above and from whence it is carried off through the air-ducts and expelled.

There is another sanitary advantage gained by the introduction of this chamber. It will afford the desired opportunity and convenience of hanging all plumbing pipes, etc., to the ceiling of this air-chamber, and thereby provide a chance to discover and repair leakages. This contrivance is inexpensive and works automatically.

The *design* of a library building implies a due consideration of the constructive necessities and of propriety of materials coupled with analytical investigation of the conditions imposed by the programme and of the methods whereby they can be expressed in a material organism.

Pugin says: "The great test of architectural beauty is the fitness of the design to the purpose for which it is intended, and that the style of the building should so correspond with its use, that the spectator may at once perceive the purpose for which it was created."

It has been my aim to put into compact shape the suggestions of a long experience in the matter of the construction of libraries and other buildings. In the limited time allowed me for this paper, it was impossible for me to do more than cursorily call attention to the mark of progress in all things that pertain to our exalted profession. Where volumes might be written, I have been compelled so to curtail, that this crude paper can only hint at the requirements which an advanced civilization teaches to be necessary to the proper construction of library buildings.

Very respectfully, J. L. Smithmeyer, F. A. I. A.

ARCHITECTURAL DRAWINGS AT CHICAGO.

As the criticism of American architecture by an intelligent foreigner is apt to be more entertaining and instructive than that of an equally intelligent native, we believe our readers will be glad to read the following extract from a description of the exhibition of drawings, at Chicago, published in the *Builder:*

The American architectural drawings are placed in the upper galleries of the Fine Art Building, and consist of a somewhat heterogeneous collection of executed work, competition drawings, students' work and photographic details. Although the collection contains many examples of good work, there can be no doubt that, on the whole, the Americans have missed a great opportunity of showing the architects of all nations what they are doing and what they can do in the way of architectural drawing, for the Exhibition cannot be said to be representative of all that is best in American draughtsmanship.

It is, however, a fact which the Americans themselves acknowledge, that show-drawings, as we understand them, are not often prepared, at any rate, to such a large extent as in England, and this is but natural in a country where everything is done in such a hurry and under such pressure as in the States. It has even been said that in the hurry of work buildings have been commenced before the drawings have been completed, and that as for exhibition drawings, the answer would be that a photograph would be taken when the "job was through." This is, of course, extreme, but it may serve to point out in what direction the fault lies. The first thing which naturally impresses itself on one is the absence of some of the latest large works from the Exhibition. Church work is almost entirely absent, and the works mostly *en evidence* are tall business premises treated on a very large scale with somewhat startling color. Small country houses are plentiful, and illustrate the well-known American school of draughtsmanship which has been introduced of late years into England, and which errs by the introduction of tricks and unnatural effects, but which is always bright, and never overladen or "worked up," as in some of the older styles of draughtsmanship. There is practically no students' work, as we understand the term; that is to say, no sketches or measured-work. The reasons for this are not far to seek, in that there is nothing old or interesting enough to sketch or measure in the States. This fact is also emphasized by American students going to the École des Beaux-Arts at Paris, or studying in their own architectural schools, which are founded on it, and we know that out-door sketching and the measurement of old buildings are not a part of that system.

There are, however, in the collection several *projets* executed from the École and from private *ateliers* in Paris; these studies show, as usual, the unsuitability of the treatment to the subject in hand, although, from the point-of-view of composition, they may, and doubtless do, answer their purpose.

Mr. L. J. Millet, himself an architect-student of the École and Lecturer on Architecture at the Art Institute of Chicago, has had the arrangement of the drawings, and has endeavored to keep those by the same architects in groups, a method which, curiously enough, was adopted simultaneously this year at the Royal Academy, with good results.

Perspective and geometrically shaded drawings seem fairly evenly divided, the perspectives being always employed, as is natural, in the country houses and smaller works, and in some of the bigger works in which color is the medium employed. One finds extreme difficulty in generalizing anything which is American; whether in architecture, painting or sculpture, there seems no standard of general excellence; for instance, you find some drawings executed with a care and freshness which is positively delightful, and on the next screen you are horrified to find a drawing which is characteristic of the very beginner. For this reason, it will be best to make a few notes of the more important contributions.

Mr. Richard M. Hunt's only contribution is a drawing, twelve feet high by three feet wide, of a part of the house for Mr. W. K. Vanderbilt, delicately modelled in the Early French Renaissance style, and which consists of three stories and a roof modelled after the Château de Blois, the niches containing statuary, while the angle turrets are elaborately carved.

Messrs. Adler & Sullivan, of Chicago, send pen-drawings of the UnionTrust Building at St. Louis, in which the principles advocated by these architects are well exemplified. It is a fifteen-story building on a corner site. Light is obtained on the long side in a way that is becoming characteristic in America, and which has been adopted at the new Women's Temple at Chicago, viz, by recessing the central portion of the façade and thus forming a court, with one side left open to the street, which is, of course, a great improvement on an internal court. The two lower stories are thrown into a basement with semicircular upper windows and predominating horizontal lines, thus binding the lower part of the structure well together; the next ten stories are grouped together between piers connected at the top with semicircular arches, the windows being recessed between these and treated plainly. Above this comes a strong horizontal band, and the next two stories are enclosed under columns supporting a massive projecting cornice, the top story being lighted from the roof. The principle of the design seems right, and it certainly emphasizes the architects' idea that unity is the first great principle of composition, and that every building, whether high or low, should be enclosed within one main idea and should not be a succession of floors piled one above the other without reference to the scheme as a whole. The detail of the great semicircular entrance doorway reminds one somewhat of the intricate sculpture work at the Golden Gate of the Transportation Building by the same architects. The design is rendered in a slightly-finished pen-and-ink perspective.

Near this is a drawing by Mr. Bruce Price, which, as hinted at previously, is a good example of what *not* to do. It is an elevation in water-color of a design for a high building. Mr. Price has taken the Tower of St. Mark's, at Venice, with the marble loggia at the base included, and by the introduction of the windows to each story he has turned it into a modern American "sky-scraper." It is true he is able to get thirty-two stories into his building, but where is the American inventiveness about which we hear so much? Any Yankee notion would be better than this, and it is difficult to understand how such a design could have found a place in the Exhibition.

In the corner bay, hard by, are three large framed drawings by Messrs. Cram, Wentworth & Goodhue, of Boston, which are interesting in many ways. They are drawn to a large size, each being six feet by four feet, and are designs for three churches of some pretentions, of which, as already remarked, there are few in the Exhibition. One of these is executed in monochrome, while two are in pen-and-ink, after the English methods in many respects, but in which a new device, called, "spattering" in the States, has been introduced in the following way: When a large plain wall-surface

occurs in a drawing, which it is desired to cover so as to give it an appearance of texture of stonework, or plaster, or what not, the rest of the drawing is covered up with the exception of the part to receive the tone, and a brush full of ink is then drawn along a comb, sprinkling the drawing to any desired shade, and really giving it a very soft and agreeable effect. It produces somewhat the same effect as light washes in conjunction with pen-work. These churches are more English in composition and treatment than any in the collection, and remind one somewhat of the late John Sedding's work; For example, we notice the same large west window, with its three buttressed divisions, the square towers enriched at top with small spirelets of copper, and the turrets as at Trinity Church, Sloane Square. Whether either of the architects are English, we are unable to say, if not, the influence of the *Builder* plates has found its way to Boston, Mass.

Alongside, Messrs. Lamb & Rich send some large frames. One is a bromide enlargement of a pencil drawing, which comes out very softly, although the lines are somewhat distorted from being enlarged. This is certainly a novel way of getting a large architectural drawing, but the effect is a somewhat blurred one.

In the next bay is a large water-color drawing of the New York State Building at the Fair, by Messrs. McKim, Mead & White. The design is founded very literally on that of the Villa Medici at Rome. The coloring is somewhat overdone, and the blue of the sky not cleverly handled.

No. 3238 is a four-story building, executed in monochrome, by Hughson Hawley, who has executed a number of drawings in the collection, but whose standard varies very much. Close at hand is a small drawing by Messrs. Rossiter & Wright, of New York. It is executed in pencil on gray paper, and is a design for a small country house to be executed in gray stone. The only coloring is that put on the red tile roofs, and brick chimney-stacks which start directly from the stone at the eaves level. The drawing is very quietly treated, and seems to us the right principle to bear in mind for an architectural drawing, especially in view of the tricky innovations of the present day. Almost next to this, and by the same architects, is a perspective and small plan of the Clark Memorial Library on Long Island, treated in pencil on gray-toned paper with slight color indications on walls; the building is small, containing only a library with alcove, reading-room and librarian's room and with museum over large library, and with open-timber roof. A couple of trees crisply put complete the drawing, which is one of the most satisfactory of its kind in the show.

Photographs are admitted, and we wonder how long it will be before that much abused institution, the Royal Academy, will allow this form of representation on the walls of the Architectural Room, a method of portrayal which is at once the most truthful and the most satisfactory of any kind. That of the Madison Square Tower at New York, designed after the famous Giralda at Seville, by Messrs. McKim, Mead & White, of New York, is very satisfactory, as showing the grouping with the surrounding buildings.

Here follow several large École designs by students, in which the plans occupy most of the space, and scores of which might be seen in any French exhibition. A very well thought-out set are, however, sent by Mr. T. F. Turner, a pupil of M. Paul Blondel.

Perhaps the most satisfactory piece of pen-work is the drawing of the new City-hall for Boston, Mass., by E. M. Wheelwright, architect, and which is drawn by Mr. Charles D. Maginnis. The design is apparently founded on Bramante's Cancelleria Palace at Rome; the building being large, and the drawing of it comparatively small, the architectural features have had to be very judiciously put in, so as not to overcrowd the drawing, and Mr. Maginnis has had to adopt a sort of architectural shorthand. There is not a ruled line on the drawing, all the straight cornices naturally occurring in a Renaissance work of this kind being put in by hand; the shadow of the loggia on the top story is effectively put-in, while no cross-hatching appears at all, the difference in tone being obtained by thickness and closeness of line. The shadows from cornices are treated as being produced by sunlight high in the heavens, and almost in front, and are sharply expressed, reminding one somewhat of the method of Mr. Gerald Horsley. The figures and statuary are equally well done. It is such exquisite pieces of work as this, which it would be impossible to improve upon, which make it very difficult to generalize on the collection as a whole.

Mr. Wheelwright also sends his design for a primary school-house at Boston, also executed by Mr. Maginnis. It is a Classical composition, two stories in height, with projecting top cornice, the lower story rusticated, with small, square windows and large doorway at each end, and the upper floor with large, semicircular windows, grouped towards the centre.

In the exhibition are several competition drawings executed for the Cathedral of St. John at New York. We note that by Mr. W. H. Wood, a fly-away pen-and-ink drawing in which lights and shades are contrasted together in an alarming way. No. 3390 is another set, in line, by Mr. R. W. Gibson, an Englishman settled in New York, and which is in every way superior to the last-named. The Americans do not, for the most part, seem capable of designing anything well in the Gothic style, and especially a building of this magnitude, and it seems certain that anything we are to expect from America must come from the new conditions of life which exist there, and which involve new problems for the architect, and not from anything which has gone before, and which, of necessity, does not commend itself to the American architect.

Messrs. Carrère & Hastings send several large drawings of their magnificent Hôtel Ponce de Léon at St. Augustine, Florida. This hotel is constructed externally of white plaster, with red brick dressings to windows and red Italian tile roofs. The grouping is symmetrical, with towers and open loggia, emphasizing points on the plan, and a bright effect is obtained by the introduction of palm-trees and green shrubs and by the bright-blue Florida sky. The size of this water-color is about twelve feet by six feet, and we are glad to note that a ground-plan almost the same size has been sent and placed over so that the *rationale* of the design can be followed. In many instances, however, no plan appears with the elevations or perspectives, which is, we suppose, a concession to the vulgar idea of making a pretty picture for the public to gaze at without reference to its real merits as a design.

Large drawings of several high buildings appear. In these, water-color has naturally been the medium selected by the draughtsmen, in view of the large amount of space to be covered. Amongst others, Messrs. Shepley, Rutan & Coolidge, of Boston and Chicago, and who succeeded the late Mr. H. H. Richardson in his practice, send a large water-color about eleven feet high by six feet wide, showing the Ames Building at Boston, a structure thirteen stories high. A Romanesque feeling runs through the features, as was to be expected, but we cannot help thinking that the principle adopted by Messrs. Adler & Sullivan is the only way to design these high buildings, and that the placing of stories one above the other, and marked with horizontal bands, and with no unity of expression, almost looks wrong.

What we may term architectural impressionism is somewhat largely illustrated. It is difficult to draw the line between this and mere sketches, perhaps, but Mr. Arthur Rotch sends a clever little pencil-sketch of a country house in perspective in the Italian Renaissance style, with large, overhanging eaves, the walls of yellow color, and with dark-tiled roof. It is a very good example of a water-color, with general masses indicated. The California State Building, in the World's Fair, by Mr. A. Page Brown, which, in itself, is a very interesting structure, is shown by a hideous scene-painter's drawing in bright green and red. The design itself is made up of materials from the old Spanish missions in California, and is one of the most pleasing of the State Buildings.

One of the most careful pen-drawings is that of a design by Mr. H. J. Hardenbergh for an art-club, in a very small type of François I style, in which some strong sunlight effects are introduced in keeping with the best American style. Messrs. Holabird & Roche, architects of the Live-stock Pavilion at the Fair, send some quietly-colored drawings of their work, that of the First Sheridan Tower being especially characteristic of American work. It represents a square tower with solid, circular, projecting angles and low, segmental doorway at base, the upper story being projected on corbels to come near the edge of angle-projections, and treated with upper colonnade and pyramidal roof with rounded edges, the whole design rather reminding one of Richardson's work.

Messrs. Holabird & Roche also send a good water-color perspective of their new "Old Colony Building" at Chicago, now being erected in a central part of the town. It is seventeen stories in height, in gray stone, with circular, corbelled bays at the angles, plain, square-headed windows and boldly-designed cornice, the upper stories enclosed, as it were, to form a frieze, and forming one of the most satisfactory of the high buildings at Chicago.

No. 3338 shows a bright sketch in pen-and-ink of a country house such as we are accustomed to see in the American illustrated journals, the idea in the architect's mind being, apparently, to make as much roof and as little wall as possible. It is sketchily put-in with sloping walls and placed on a hillock. No information is given, and it is possibly a fancy sketch to catch a client.

Some large drawings hard by, in the French manner of a "design for a suburban residence," by an École student, show about as little knowledge of the requirements as is possible to imagine. If the title had been altered to "A Prince's Country Mansion" the case would have been very different.

Messrs. Le Brun & Son, of New York, exhibit a neatly-colored water-color of a new ten-story office-block, the Metropolitan Building in the Madison Square, at New York. It is built of white stone, and unity is attained by enclosing several stories under one arch.

Messrs. Peabody & Stearns send a sheet of office-sketches, in color, of buildings erected by them, many of which are very effective; but, considering that Messrs. Peabody & Stearns have done done some of the best domestic works recently erected in the States, many of which are at Newport, R. I., these sketches do not do justice to them, and it is a pity they were unable to send more drawings. This is, however, only a further illustration of the fact that even the foremost architects of the States do not give time to the preparation of show-drawings.

An unexecuted house by Messrs. Andrews, Jaques & Rantoul is shown in a bold sepia drawing which is quite Elizabethan in character, with mullioned windows and diapered walls, and with terraced front, making altogether a composition which must have been studied by one having an acquaintance with English precedent, which is very rare indeed in the collection.

In the enlargement of the Cambridge City-hall (Mass.), by Messrs.

Longfellow, Alden & Harlow, the late Mr. Richardson's influence is clearly seen. It has been executed in rough-faced granite, with steep-pitched roof and dormers, with massive central tower, and with open upper stages as campanile. Another firm of architects who send works of interest is Messrs. Gilbert & Taylor, whose design for a frame-built house, with granite basement, is shown in a very cleverly-executed pen-and-ink drawing by Mr. Gilbert, who also shows an exquisitely-drawn little sketch of a stone church at the foot of a hill at St. Paul, Minn, in which the grouping is cleverly handled.

The armory for the Thirteenth Regiment at Brooklyn, by Mr. R. L. Daus, is a very appropriate piece of work, and is being executed at the present time. It is shown by a good water-color drawing, and is of unpolished red granite in a castellated manner, with huge semicircular entrance arch, flanked by circular towers, the rest of the design kept dignified and severe, the upper part of the towers corbelled over castellated. Mr. Daus has studied at the Paris Ecole, but in this design he has shown that he can, like Richardson, forget a good deal of what is taught there. In conclusion, we should say that the Exhibition, although not by any means strong, is, perhaps, a fair one, but that it contains extremes of good and bad work, both in regard to draughtsmanship and design, while water-color and pen-and-ink seem to hold even sway. Church work must be very badly represented, because we know that some very good work on a small scale has been done under the influence of the late Mr. Richardson. No designs for stained glass, which take up so much valuable space in our Royal Academy, are present in the collection, and color decoration is not represented at all in regard to studies for exterior or interior work. But taking into account the apathy of the American architects to making "show drawings," we should say that the collection is a fairly representative one of the state of American architecture at the present time, and compares very favorably with our own collection at Chicago.

THE SUBSTITUTION OF DAY-LABOR FOR CONTRACT WORK.— THREE INSTANCES OF SUCH SUBSTITUTION. — WATER-PIPES DAMAGED BY ELECTROLYTIC ACTION. — VISITING FRENCH ENGINEERS. — WIND-PRESSURE AND BUILDING-STRAINS. — A SCHEME FOR SECURING DESIGNS FOR PRESBYTERIAN CHURCHES.

EVERY now and then one's attention is casually attracted to some movement in connection with the building trades by a paragraph in a daily paper — it may be from some remote quarter of the globe or from some place near at hand — that for the time excites an interest, which, however, soon flags for want of further notices of the matter; but the absence of such further notices does not at all imply that the subject is at an end and later on one is startled to find that the movement, whatever may be its nature, has all the time been growing until it has reached proportions that are likely to be formidable if it is of a character of real importance. One such movement that should not be overlooked, but which does not seem to be attracting the attention it deserves, is the substitution of day-labor for contract-work. The subject is not a new one and, therefore, perhaps, it is less likely to be noticed. Often and often one has seen paragraphs to the effect that such and such works are about to be carried out and that no contracts will be entered into, but that the work will be done by day-labor. Now, however, these paragraphs are becoming much more frequent and we see works of the first magnitude attempted in this loose and slipshod and unbusinesslike method. In some cases the idea is that (especially in municipal works) the proprietors will save the builder's profit; the proprietor becomes the builder, hires the men and supplies the material, but so far, the results of such a proceeding do not appear to be very satisfactory to those who have to pay the bills. And yet we find that this method is growing more and more in favor, and despite the experience of those who have burned their fingers, when the opportunity arises, proprietors seem anxious to give it a trial. It would be well if the attention of all interested in such matters could be aroused to investigate it. Several attempts to introduce this system have recently been made in Canada, and some important works have been so carried out, while others are at the present time being executed after this plan. Some works, no doubt there are, for which it is impossible, from the uncertainty of the actual necessary work to be done, to arrange contracts. These are generally in the nature of drainage works, or perhaps, in connection with systems of water-supply or railroad-tunnelling and so forth, but it is very seldom that constructive works cannot be perfectly figured out beforehand and properly estimated and contracted for. A few years ago an iron railway bridge on the cantilever principle was constructed over the Lachine Canal near Montreal, the estimated cost of the work was $250,000. Here was a case in which there was no reason at all against entering into proper contracts for the execution of the work, but it was a Government work and the officials in charge decided to carry it out by day-labor with the result that the actual cost has been $200,000 above the estimate. Recently, too, a very vigorous attempt was made by a section of the Montreal City Council to have some important works, such as the widening of several streets which necessitated the pulling-down of continuous rows of houses and shops, done by day-labor. Violent opposition, however, was offered and after very much delay and several unseemly scenes at the meetings, those in favor of contracts gained the day. In Toronto, as has already been remarked in a former letter, the Court-house is now being built on the day-labor system and the rate-payers are watching the progress of the work with no little anxiety. The cost is to be about a million and a quarter, but the heavy bills for wages paid fortnightly by the City Treasurer may well arouse the fears of the public who of course are not aware of the actual progress beyond what they can see upon the site. The architect here is practically the contractor. After the failure of the original builder and the subsequent tendering for the completion of the works, the author of the finally-accepted tender refused to go on and the architect taking the matter into his own hands decided to complete the work by day-labor. This case is no doubt somewhat unique and it is doubtful whether any architect ever occupied the position that the architect of this building now does. The City Council and the Court-house Committee have practically washed their hands of the affair, the entire responsibility has been laid upon the architect and been accepted by him; he has to provide a Court-house complete, according to an accepted plan, and hand it over to the City Council ready for use within a stipulated time. The City Council have given their treasurer orders to pay whatever accounts he "initials" up to a certain amount, and while this game goes on the rate-payers have to wait in silent anxiety. These three instances of day-labor applied to works of considerable importance (or attempted to be applied) certainly mark an important phase in the history of building.

Another matter still more remarkable, however, should be brought to the notice particularly of the officials of the water-works department of every city. Electricity (no one will gainsay it) is a very remarkable servant and despite all that experts in its treatment have yet been able to do by way of controlling it, it still likes sometimes to show that it is a long way from being tamed or domesticated, if it gets a chance of freedom. The Water-works Department of the City of Hamilton, Ontario, has been seriously troubled by a freak of the "fluid." The city is furnished with an electric-railway system on the "trolley" principle, and it has been found that in the streets where electric-cars run the outside of the lead water-pipes laid under the ground is eaten away by (what the papers speak of as) "electrolytic action." Such appears to be the result, though the reason for it has not yet been satisfactorily discovered; but it is curious that the place where the pipes were most affected is in the neighborhood of the power-house. A possible cause may be found in the fact that all water in the subsoil drains away rapidly into the bay, owing to the grade on which the city stands, thereby leaving the subsoil particularly dry, so that the electric fluid conducted into it for dispersal does not readily disperse and acts upon the metal it finds there on its way to "ground" elsewhere. The matter, however, will be investigated.

The two French engineers, Baron Tournette de Rochemond (Inspector-general of Bridges and Approaches at Paris) and M. Henri Vetilart (Engineer-in-chief of Bridges and Approaches at Havre) who were sent by their Government, together with six other engineers, to the World's Fair, to examine into various engineering works exhibited there, have paid a visit to Canada on their way home and had an interview in Ottawa with Mr. Schreiber, the Chief Engineer of Railways and Canals. Part of their mission was to inspect some of the principal public works of this country. On their way to Ottawa they spent some time examining the Sault Ste. Marie Canal, now in course of construction, and they expressed it as their opinion that this canal is the finest piece of work they have ever seen. This is high praise, for these engineers have inspected the principal canals of Europe, and recently the Manchester Ship-canal, which is the most modern one of importance. They have asked for plans of certain portions of the work. They propose to visit the Chignecto Ship-railway and the Halifax Graving-dock before leaving Canada.

The *Canadian Architect and Builder* calls attention to the "growing frequency of wind storms" of great severity and violence in Canada, and warns architects that they should take such matters into consideration in calculating the strength of their buildings. The warning is not unnecessary, for although the Dominion has rarely been visited by more than the tail of the cyclones which do so much damage in the United States, these tails have lately been very powerful, and although hitherto our buildings have not suffered much, now that the fashion of "sky-scrapers" is coming in, while they are few and far between, their upper portions, at least, get the full benefit of the gales.

Some time ago we mentioned a competition of an unusual nature, one proposed by the leaders of the Presbyterian Church in Canada, the object of which was to secure fair designs for churches of all sizes for the purpose of improving their church architecture. The intention was to publish a number of these designs in a pamphlet and circulate among all their congregations so that any one who intended building a new church might by reference to this pamphlet see

what could be obtained for the money proposed to be expended. The name of the author of each design was to be appended and it was supposed that in selecting a design, the committee would apply to the author for drawings for their church. The conduct of the competition was left in the hands of the Council of the Ontario Association of Architects and small prizes were offered. The first competition met with very little success, possibly the intention of the promoters was not well understood and the prizes were not sufficiently tempting, but now several designs have been secured and a pamphlet of nearly forty pages has been issued containing designs for churches suitable for country villages and towns. Whether the hopes of the architects whose designs are published will be realized remains to be seen; but from previous experience, it is more likely that an author will find his design copied by local builders with perhaps such alterations as may be suggested by the genius of the village.

A remarkable story comes from the country in this connection. A town-hall and market-building were to be erected at a cost of about $20,000 but the committee decided in the first place that the services of an architect were entirely unnecessary. A local carpenter was asked to prepare a design in the rough, he being credited with a genius that way, and when this was submitted, a builder was asked to put it into shape for contracting, or in other words, perhaps, he was to reduce the rough "sketch" to a scale-drawing. This having been done a great difficulty, apparently quite unforeseen, arose: the design was approved by some but not by all, and the parties were pretty nearly divided: a dead-lock ensued; high words were bandied about and a considerable amount of ill feeling was generated. Meeting after meeting was held but no advance was made towards a settlement of the question, but when matters were beginning to reach serious proportions, some person gifted with more intelligence than his neighbors (let us suppose it was the mayor), suggested that the advice of an architect might after all be of some service to them. A vote was taken with the result that a unanimous invitation was sent, with the request that the representative of the profession would come with all speed.

ITALIAN CITIES.[1] — X.

VENICE. — II.

VENICE is perhaps the only city which surpasses all imaginings. It would be vain to exaggerate the picture in advance. It would be vain to dream of more wonderful things. From the moment one enters the lagoon, one recognizes that it was not possible to preconceive the brilliancy, the fantasticality, the strangeness, the originality of the picture which one has before his eyes. A city built in the water, which seems to float in the azure like a fantastic boat, surmounted with domes and towers, is in itself a dazzling rarity; but when this city is, besides, a vast metropolis, which during several centuries has governed a large portion of the world, and has accumulated in its history the most glorious and redoubtable remembrances; when this capital offers the almost inconceivable specialty of containing, heaped one upon another, the most widely differing specimens of man's art work, it is easy to understand that the imagination of the greatest poet cannot present an idea of it before having seen it. Here one would say one had arrived at a place where, during five hundred years, a marauding people were pleased to gather together the fruits of its rapine. They set out on an expedition and pillaged at hazard, and returned laden with booty to increase the common riches, and it is thus that churches rose by the side of other churches, palaces before palaces, and bridges, quays, campaniles, porticos ranged themselves one after another without order, without rule, without prearranged plan but in an altogether happy-go-lucky manner. It is an accumulation of things unheard of, grandiose, unconnected, dissimilar, which considered separately would be horrible, but which, on the other hand, in this unconscious disorder, in this accidental grouping, in this decoration touched-in in haste like a drop-scene daubed-in hurriedly, harmonize with one another, and agree together through the very strangeness of their forms and the unexpectedness of their juxtaposition. Every century, every style, every people, every taste, every species, every aberration here finds expression, and has joined the heap. It would be impossible to sort it out and classify its separate parts.

To describe Venice, it would be necessary to compile several volumes, and after one had filled an entire library, he would only perceive that the work must be begun all over again. It is necessary, therefore, after having remarked the general character of the city, to limit one's self to noting the most considerable monuments.

The three branches of art had in this city a most brilliant blossoming. Sculpture did not make so good a showing as painting or as architecture; but yet she could not fail to occupy and retain an important place in a city where at a given moment gathered the most able artists of the peninsula.

The first influence which began to make itself felt was that of the Tuscans in the fourteenth century, an epoch when the school of Pisa took the first step and excited the emulation of all Italy. This influence is especially visible in the statues of Jacobello in the Church of St. Mark. Then after the Buoni and the Lombardi, the genius of the Renaissance affirmed itself in full brilliancy with Sansovino, who gave to Venice the best of his talent, and there founded a school to which belonged many sculptors of worth. After the age of Sansovino came the time of the Decadence, which lasted to our time, and which was interrupted only by one instance, a phenomenal one, that of Canova, who, protected by Senator Falier, became a sculptor of the highest rank, and found himself by a strange chance, at the beginning of the century, in training to express all the graces and finesses of classic art and pagan conception, and knew enough to hark back to the purest sources of Hellenism.

Painting at Venice underwent very accidental vicissitudes. Up to the fourteenth century it was practised by mosaic-workers and Greek daubers who painted in fresco and distemper. After this epoch, the revelation prepared by Giotto and his school made its influence felt throughout the North of Italy, and did not fail to modify the tastes and fashions of the Venetian studios. There was about the commencement of the fifteenth century an unexpected kind of germination in the style local at Murano, but this germination was a little corrupted by the influences of German and Flemish painters, who, after the fashion of Van Eyck and Dürer, made long sojourns at Venice, and to this epoch dates the celebrated breviary of Cardinal Grimani, a marvel of Christian art preserved in the Ducal Palace, and which was ornamented with admirable miniatures by Memling and his Flemish colleagues. This Germanic influence is less visible, through a certain rudeness, in the works of Vivarini da Murano, at the time when Mantegna, pupil of Squarcione, had already begun to introduce into Venice the principles of his school, which invoked the principles of antiquity.

In spite of these fluctuations, Venetian painting already was adding strength to its peculiar temperament, and inclining to become that which it really became later, a school of colorists. This peculiarity is attributable to the artists' familiarity with mosaic-work, where the colors are lively and brilliant, and where each of them has its own individual color, and to the traffic with the Orient, which brought into the City of St. Mark the rich Oriental merchants, clad in brilliant stuffs and bright with jewelry of great cost.

These are, according to our views, only trivial reasons. The Venetian painter is, first of all, a colorist, because by reason of a meteorological phenomenon, which it is no part of our task to explain, the light of the Italian sky at the head of the Adriatic, upon the mirror of the lagoon, which serves as a reflector and multiplies its intensity, takes on crude and violent tones and acquires a startling brilliancy in the midst of which objects can only preserve their relief and take on, so to speak, expression on the condition of cutting the luminous background by the vivacity and strength of their color. Here, everything which does not glitter is condemned to be forced into the background and disappear under the flood of moving and enveloping light. Here the line is also condemned to soften down and be drowned in the full glowing air, and the artist's eye becomes accustomed to distinguishing the gamut of colors rather than the contours of the objects. Color and movement are the characteristic features of Venetian nature, of Venetian landscape, and this is why the painters of this country were destined, at the moment when art was beginning to arrive at full maturity, to become colorists like Titian, and impassioned and unrestrained lovers of movement like Tintoretto.

It is so certain that the ambient *milieu* must exercise over the artists of the brush at Venice an irresistible fascination; it is so true that from this *milieu* disengages itself an imperious law to which each one feels himself subjected, that the Venetian painters always somewhat resemble one another, and that it is possible to say, almost without exaggeration, that one who knows one knows them all. One thing which is certain is that, for an observer and an experienced critic, a Venetian painting is always recognized by something or another. After those two grand masters whom I have just mentioned, and who, with Giorgione and Veronese, were the most puissant interpreters of painting at Venice, art in this city ceased from following a correct inspiration, from conforming itself to good traditions, and turned, as in all the rest of Italy toward the end of the sixteenth century, to excesses and exaggerations which made certain an irremediable decadence.

In architecture, Venice has no school except in the geographical sense of the word, for the reasons which have been given above. At an early day, the Venetian people, enriched by their commerce, made vain by their power, proud of their domination, which was exercised over the northern portion of Italy and over the Adriatic, and which extended over almost all of the Orient, desired to have monuments which should be the witnesses of their force and prosperity; but, when they thought of building their cathedral, they borrowed the model from Sta. Sophia at Constantinople. When they wished to build a palace to serve as the dwelling of their Doge and Government, they built a monument in a style composed of reminiscences of Moorish and Gothic work. After the Arabic arcade in horse-shoe form, pointed, chubby and constricted at its base, we see appear the pointed opening of Germanic origin; but in the palaces and churches of the early times the Moorish note dominates, and even to-day, in passing along the canals, bordered with palaces whose façades are decorated with trefoils, with roses and arabesques, one enjoys the vision of an Oriental city transported by enchantment into the West; while Orientals, at the sight of churches where rules the key-note of Italian barocco work, and palaces through whose physiognomy pierces the Gothic style, must experience the sensation of visiting an Occidental city which tried to embark for the Orient, but has stopped short on the shores of the sea.

[1] Continued from No. 924, page 159.

Through a necessity which is derived from the very nature of its environment, Venetian architecture could not be content with the simple line; in a city built upon the water, between heaven and sea, that is to say, in a *milieu* where variety and the hues of terrestrial landscape are lacking, where there are no trees, the peculiarities of the soil, the chromatic scale of the ground, the usual purity of contours, must have given to the town a character at once *triste*, monotonous and dry. In order to impress on this city life and movement in the midst of the unity of the sky and the liquid plain, it was necessary to vary the ornaments and overload the designs and multiply the accessories, to suggest in some degree a vegetation luxuriant in details and of perpetual growth, at the risk even of falling into the barocco style, and giving birth to an art which amid other surroundings would appear coarse and awkward. And this is the reason why the *frontons*, the arcades, the colonnades, the cable-mouldings, the rosettes, the sculptured foliage, in place of being here architectural enormities, appear like embellishments; and this is why the city, considered as a whole, shows itself like a marvellous piece of embroidery, like a city constructed in a filigree of marble, like an exquisite piece of sculpture, so light, so delicate, so vaporous, so diaphanous, that in place of being built on solid piles, it seems to float vaguely on the water and lie at the mercy of the waves, like a fantastic bark half-seen in a splendid dream.

The first architects who endowed the Venetian city with local artistic tradition were the Lombardi family, founded by Pietro, and which includes at least a half-score of distinguished masters. During more than a century they peopled the city with buildings, monuments, palaces, churches and tombs, and their style was called Lombardesco. We may consider as belonging to this epoch the interior façade of the Ducal Palace, the most ancient portion of the Procuratie, the Palazzo Camerlenghi, the prisons, the Rialto, and the Bridge of Sighs. But the three masters who contributed most to complete the character of the city were San Micheli, Jacopo Tatti, called Sansovino, and Palladio. Sansovino, who was sculptor and architect, had travelled much in other parts of Italy, and especially to Rome and Florence. He therefore brought to the borders of the lagoon all the charms, all the conquests, all the faults of the Renaissance, heightened and aggrandized by the originality and inventive eccentricity of his imagination, which carried him in the direction of bold and complicated creations. He is assuredly one of the greatest artists of the sixteenth century, which was at once the century of the Renaissance and of the Decadence.

It is through one of those pieces of injustice, of which criticism and history offer too many examples, that Palladio, who was considered the continuer and successor of Sansovino, has been ranked before San Micheli in the hierarchy of the great names of art. Of all the artists who worked at Venice, Palladio is, perhaps, the one who less understood the necessities of the frame within which his works must be adapted. On the pretext of reconstructing art from the pure sources of antiquity, he imitated the ancients almost to the point of becoming a mere plagiarist. The simplicity which he labored to achieve, and which would have had, perhaps, its *raison d'être* elsewhere, gives at Venice a dryness, an aridness and relative coldness to his works, which are quite out of tune in the midst of this revelry of ornamentation, this *furore* of complications, which were, as we have said, imposed by necessity on the Venetian architect. We see this especially in the Church of San Giorgio Maggiore, in the Church of the Redentore, and in the façade of San Francesco de la Vigna. This is all the more inexplicable, because coming after, or at the same time as, Brunelleschi, Alberti, Bramante, the Peruzzi, San Micheli and the two San Gallos, he might have composed for himself a style less servilely borrowed from Classic types, and more appropriate to the peculiar necessities of Venetian environment. He thus failed of originality, and only gained distinction for having believed that the Greek artists were worth more than those of contemporaneous Italy. With these reservations, we can recognize that, in the style of which he made a specialty, he conceived some very estimable works, and that at the moment when the Decadence knocked at the doors of the Peninsula the love of Greek and Roman traditions was, perhaps, a salutary check which he had the merit of exemplifying, and which retarded and limited the debasement of art. It is especially at Vicenza, where he was born, and in its environs more, perhaps, than at Venice, that are found monuments, and especially palaces, in which he was able to give free rein to his powers of invention, and the fertility of his mind, which knew how to blend all styles by taking from each one that which was best in it. It is to be regretted that the bricks, of which, in default of marble and hard stone, he was forced to make use, give to his works an aspect of poverty and a vulgar physiognomy, and prevent them from bringing out all the graces and all the delicacy of his design.

His plans are always wisely conceived, with ordonnances well disposed, and breathe an imposing serenity; but one too much feels the control of convention and the sterile rule of preconceived formulas. At bottom, that which has contributed to rank Palladio high in the esteem of posterity is his writings, in which he has stated with extreme precision the principles and fundaments of his art, and these writings are to-day consulted with benefit by men of his profession. He is much more celebrated for the counsels he has given than by the monuments which he left behind him; and, like Vasari in painting, he has made himself illustrious by that which he said of the works of others much more than by the works which he conceived and executed himself.

San Micheli certainly had more force, more spontaneity, more breadth, more invention. He belonged, moreover, to that category of architects who knew with equal facility how to build a religious edifice or a work of defence. He was military architect of the Republic, and his adventurous and romantic life indicates a temperament at once energetic and haughty, similar in more than one particular to that of Michelangelo Buonarotti. But we will not insist upon this parallel between Palladio and San Micheli, of which we have already said enough in the article[1] which we consecrated to the city of Verona, where he was born. H. Mereu.

ILLUSTRATIONS

[*Contributors of drawings are requested to send also plans and a full and adequate description of the buildings, including a statement of cost.*]

THE ATKINSON BUILDING, SAN FRANCISCO, CAL. MR. A. PAGE BROWN, ARCHITECT, SAN FRANCISCO, CAL.

[Heliochrome, issued with the International and Imperial Editions only.]

This little building stands out alone in all San Francisco as the only one of its type and has encouraged its author to do something more in the same line. The building is built of brick cemented on the outside and the cement finished with a mixture of white sand and cement: no oil paint being used. This white sand comes from the beach at Monterey and is used in glass-making. It is almost a pure white and gives to the building a most exquisite color in contrast with the red and green. The negative for this print, which is unfortunately reversed, was made by Messrs. Andrews & Lange.

HOUSE FOR R. C. SIBLEY, ESQ.: FRONT VIEW. MR. JAMES BROWN LORD, ARCHITECT, NEW YORK, N. Y.

HOUSE FOR R. C. SIBLEY, ESQ.: GARDEN VIEW. MR. JAMES BROWN LORD, ARCHITECT, NEW YORK, N. Y.

NATIONAL FIRE INSURANCE BUILDING, HARTFORD, CONN. MR. W. C. BROCKLESBY, ARCHITECT, HARTFORD, CONN.

HOUSE FOR JOHN BERGIN, ESQ., DORCHESTER, MASS. MR. PATRICK A. TRACY, ARCHITECT, BOSTON, MASS.

[Additional Illustrations in the International Edition.]

ROSEHAUGH MANSION.

The work now being carried out consists of considerable additions to an existing house, in the form of new hall, drawing-room, billiard and smoking rooms, etc., on the ground-floor, with swimming-pond and complete arrangements for Turkish bath in the basement, and the entire remodelling and casing of the old house. In addition to the alterations, considerable works have been carried out on the estate by the present proprietor of Rosehaugh, who is one of the most progressive and enlightened of the younger landlords of the North. These include such work as the creation of a lake, the water-power obtained from which by means of turbine machinery supplies the power for electric-lighting of the mansion and estate buildings. The details of the work have been very much improved from those shown upon the published drawing, during the course of execution, and while showing certain similarity in style and treatment to English work of the sixteenth century, much of the detail is French in character, as much of the old Scotch work of this period shows distinct evidence of French influence. The plate is copied from the *Builder*.

TOMB OF GUILLAUME DU BELLAY IN THE CATHEDRAL OF MANS, FRANCE.

Guillaume du Bellay, one of six brothers of a noble family of Anjou, once viceroy of Piedmont, acquired a brilliant reputation as a soldier during the Italian wars, as a diplomatist during his embassies to England and Germany, and as a writer through having composed several works of history and poetry. He died on his return from Italy, January 5, 1543, and his brother Réne, Bishop of Mans, caused his body to be carried to Mans and entombed in the chapel of Notre Dame du Chevet, in the cathedral, but was prevented by his own death from rearing the intended monument, this task being left to his brothers Jean, Cardinal du Bellay, Bishop of Paris, and Martin, Prince d'Yvetot, then Governor of Piedmont. Well known to all who study the French sculpture of the Renaissance epoch, the tomb of the Seigneur de Langey has been several

[1] See *American Architect* for April 27, 1889, *et seq.*

times described and illustrated. Writing in 1810, Lenoir says: "The mausoleum of Langey du Bellay, of which M. Maulny has preserved the greater portion set up in the museum of the Department of Sarthe, gives a very good idea of Germain Pilon, its author. The sarcophagus is wholly of Italian marble, ornamented with a bas-relief that closely imitates the antique. The two trophies, also of Italian marble, disclose the genius which created it, and charm all *connoisseurs* by beauty of execution. The figure of Langey and the two caryatides are of Tonnerre stone. Black marble sphinxes support the sarcophagus. The loss of the ornaments of the greater portion of this mausoleum is to be regretted." Elsewhere, the same writer says: "The precious relics of the mausoleum of Langey escaped devastation in 1793." In 1793, the revolutionists seized upon the cathedral at Mans for purposes of public assembly and public *fêtes*. They there committed numberless disorders, and Garnier, the representative of Saintes, distinguished himself by causing to be broken a large number of statues which decorated the building. It is probable that the tomb of Langey was no more spared than the rest. As may be easily seen by glancing at the illustrations, which are copied from *L'Art*, the monument, in its present condition, is far from affording the impression of magnificence which was caused by the original tomb. The essential portions still remain, but the harmony of the composition is destroyed. If the statue, the marine frieze ornamenting the sarcophagus and the guardian caryatides are admirable, they are admirable as isolated fragments. There now exist in the monument wide vacant spaces wholly opposed to the genius of the Renaissance, and the statue stands out against a background which adds nothing to its worth.

Nowadays, however, we have certain information that the attribution of the tomb to Germain Pilon is out of the question, since Pilon was born in 1535, and the statue must have been executed about 1548. Placing reliance upon the resemblances which exist between this statue and that of Admiral Chabot, M. Palustre infers that it is the work of Jean Cousin. As to the marine frieze, it appears to be the work of Italian artists. Whatever may be the real truth as to the author of the monument, the matter is of secondary importance. The thing of real interest, and the one which attracts us, is the majestic beauty of this half-reclining male figure, these caryatides, with their grim countenances, and the movement in the frieze, where live and palpitate about a female figure, sea-gods and marine animals.

ITALIAN FOUNTAIN.

THIS plate is copied from *Architektonische Rundschau.*

THE NEW RAILWAY-STATION AT HALLE.

THIS plate is copied from the *Zeitschrift für Bauwesen* from which we borrowed other details of the same building which were published in our issue for July 29.

STANMORE HALL LIBRARY.

IN this part of Stanmore Hall it is satisfactory to see a modern treatment of ornament that is not out of place with Gothic woodwork, and the result, if compared with some late examples of libraries in houses, must be judged to be attractive and suitable.

THE CHAPTER-HOUSE OF A CATHEDRAL.

THE plate is a reproduction of the principal elevation of a design prepared according to the conditions of and submitted in the Soane Medallion competition of 1891. The drawing illustrated was hung in this year's Academy. The materials chosen are red brick and stone, with a lead-covered roof. The plan is hexagonal, giving an interior, vaulted in brick, with stone ribs. A feature is made of the central shaft — a treatment which is typical of the best examples of the chapter-house extant, and too thoroughly in accordance with the traditional character of the building to be set aside for the questionable advantage of a free floor, gained in a chapter-house which, baptistery-like, has no central shaft. The design is by Mr. John Begg.

ULM, AFTER A DRAWING BY SAMUEL PROUT.

COMMUNICATIONS

[*The editors cannot pay attention to demands of correspondents who forget to give their names and addresses as guaranty of good faith; nor do they hold themselves responsible for opinions expressed by their correspondents.*]

MR. ATKINSON AND THE WORLD'S FAIR BUILDINGS.

BOSTON, MASS., September 23, 1893.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Having been again at Chicago, I believe I have missed one rejoinder which you made to my review of the buildings of the great Fair. A rejoinder in which I am said to be "one-sided in" dealing with architects and architecture has attracted my attention. I fully admit that you are right. I am one-sided in dealing with architecture in general and with the architecture of the Fair in particular, for the reason that the practice of the architect according to my experience is a one-sided art. It is so exclusively a fine art as to make it unsafe as a rule, for the mill and workshop constructor to consult the professional architect or to be guided by him lest in the effort to give a better æsthetic or artistic appearance to the industrial buildings, utility, light or air should be sacrificed. As for instance the present tendency, so strongly developed by the late Mr. Richardson, to the round arched window is one to be absolutely avoided in the construction of the factory, the workshop, the warehouse or the office-building in which light is a very important element — the top light being the most essential. You express some surprise that a Philistine like myself should have been, as one may say, so entranced with the beauty of the buildings at Chicago. Ought it to be a matter of surprise that one who deplores the bare and inartistic quality of the buildings with which he is habitually called to deal, should be impressed by the artistic beauty of others?

If you are right in saying that the purpose of the Chicago Exposition was not to make an exhibit of industrial progress then I am prepared to admit that complete success has been attained in the artistic effect of the buildings; but at a very excessive cost as compared to the type of buildings which would have given a much more suitable expression to industrial progress. I differ with you wholly as to what might have been the purpose of the Exposition and would have been under certain other conditions which were changed when the situs of the Exposition was fixed at Chicago. I also differ with you wholly as to the relative attendance and profit, in proportion to the expenditure, under the conditions of an exhibition devoted to the development of progress in all arts.

You cite my favorite advocacy of low buildings — one, two and three stories as against the narrow, high and unsightly factory buildings which are so common; you speak of this class of buildings as if the function of the architect had nothing to do with them. If such is the fact then the profession of architect is separated by a party-wall, through which no passage can be made, from the practice of the engineer who is in charge of mill, work-shop and warehouse construction. It is that separation which I have endeavored to break down and perhaps with some effect. The rules of mill-construction have been adopted by some of the best architects in the country — sometimes in their integrity — sometimes so perverted as to utterly fail of their purpose and also fail even in their artistic effect.

I have cited two buildings in the Chicago Fair as almost the only ones from which any lesson could be taken to be carried outside the gates for application in the work of life. These two buildings are the Workman's Model Dwelling, built of brick, for one family, corresponding to those which are so numerous in Philadelphia, and the Workman's Model House built of wood, belonging to the exhibit of the State of New York. The question arises whether or not there is an architect competent to build a workman's dwelling corresponding in floor area to the one exhibited at Chicago at a cost of one thousand dollars, which will be more pleasant to the eye and a better object-lesson in cultivating the taste of those who must dwell in such houses, than this one is.

Your Philistine correspondent thinks he could do vastly better with the thousand dollars both in construction and in æsthetic effect and he means to make a trial; but as he is himself incapable of drawing anything or putting any conception of artistic effect on paper he would probably fail without the assistance of his son. He, however, puts this question, Is the profession of architecture so one-sided as to make it difficult for the Editor of the *American Architect* to name one of the profession who could apply the fine art claimed in its practice to the construction of a workman's dwelling built of wood at a cost of one thousand dollars, which would satisfy the requirements of life and at the same time satisfy the artist? So far as the experience of the undersigned covers the ground the members of the profession fail to do satisfactory work at low cost in wood or even in brick. In the construction of this class of small dwelling-houses at low cost there have been worse failures æsthetically on the part of architects than in examples which have been set up by the mill constructors and engineers. If the factory, the work-shop, the workman's dwelling and the operative's house are not worthy of attention by those who are engaged in architecture as a fine art, then I adhere to my original statement that we must wait for the true artist yet to be born who can develop architecture as the great artists of old time did who were engineers and builders as well as artists. If that is a one-sided view then I claim all the merit of being a one-sided man in dealing with this subject; namely, dealing with that side of the profession which up to this time has been almost wholly neglected.

If the motive of human welfare is not as true an incentive to the artist as the motives which governed the constructors of Grecian temples, mediæval cathedrals and the castellated palaces of the old world, then the architect must give place to the artisan and cease to attempt to put extraneous decoration upon buildings which are wholly intended for use. I have not myself so low an opinion of the profession as to believe it cannot be elevated to a plane in which it may cope with motives of modern life without putting crazy and combustible roofs on top of exterior structures that obscure the light — fail to impart wholesome conditions to the interior — and

which contains the cellular structure which will cost this country an ash heap valued at one hundred and fifty million dollars in the present year.

If that is a one-sided view of the profession then I hope that the architects in a body will come over to my side ere long. We may then have less art and more comfort in our dwelling-houses — less æsthetic effect and a more true adaptation of the true principles of art in industrial buildings; fewer picturesque hospitals of irregular form surmounted by crazy roofs and a greater number of buildings in which the cure of disease and the care of the incapable may be more safely and surely conducted; fewer ambitious attempts and more successful results in adapting each class of buildings to the motive and purpose on which it is to be put in use.

Edward Atkinson.

[As usual we find Mr. Atkinson very largely in the right but as usual, too, we find him disposed to hold the architect solely responsible for sins of commission and omission which logic and ethics demand shall be shared between the architect, the client, the insurance companies and the municipal authorities. He usually assumes the position that architects employ imperfect and undesirable methods because they are ignorant of the existence of other methods or are incapable of employing them when they are known. We, on the other hand, know that the real state of the case is that they do know and can use approximately perfect methods but are restrained from using them because the common foible of humanity to gamble allows the client, with the abetting of the insurance companies and the authorities, to take risks which all four parties concerned know ought not to be taken. We still believe that architects are useful members of society and have a right to the livelihood they earn and to a certain amount of gratitude from the public at large even if they do not devote themselves to the designing of industrial buildings. We still remain convinced that the problem the architects of the World's Fair buildings were asked to solve was not to produce specimens of architecture that could be "carried away from the gates of the Park for application" elsewhere. They were required to prepare buildings of temporary (therefore visionary or dreamlike — "Hellenic" or otherwise) nature suitable for a grand holiday occasion which was to satisfy and instruct the æsthetic nature of man quite as much as to show him how he could add to his physical comfort and increase his money gain by the practice of strict economic principles in several directions. The buildings for a grand holiday occasion should be, and properly have been, differentiated from buildings that can be taken away and used elsewhere as greatly as a grand holiday differs from the common working-day. As to the workman's cottage, we do not doubt that there are hundreds, even thousands, of architects who could build a hygienic and enduring workman's cottage at a cost of $1,000 which would be acceptable to the artistic sense, but it would be an unprofitable task to try to earn a living by devoting one's attention to this class of work. Mr. Atkinson's communication suggests several questions which he may be able to answer. How large a percentage of mill and industrial buildings have ever been entrusted to the care of such architects as have shown themselves competent to produce artistic results when equivalent sums of money have been entrusted to their handling? How many workmen having $1,000 to spend resort to architects for their designs as compared with those who go to the nearest carpenter? Is it known how many industrial buildings or workmen's homes Michael Angelo, Leonardo da Vinci or Brunelleschi designed and built to the acceptance of those men of their day of a Philistine cast of mind? They are known to have been good engineers, but is it known that the modern architect under similar conditions would not prove himself as competent in this direction? Is it really supposed that there are no architects in this day and country who could, if they were willing, design and build a mill or workman's house as substantial, as economical of cost and material and as barren of artistic feeling as such structures are now produced by those who have not made the production of artistic effects a prime consideration? If an architect is one who by instinct would produce a beautiful effect regardless of cost and excess of strength, and if an engineer is one who by instinct would produce a structure economical in cost, having no useless surplus of strength and absolutely disregardful of "looks," they must perforce in these days of haste and complicated living be employed together to produce those fully satisfactory results that we, as well as Mr. Atkinson, would like to see achieved. But then the capitalist must be content to pay a living to each colaborer, and as the capitalist is the most confirmed of gamblers he is not ready yet to take this step which would do as much as anything to give actuality to that millenium we all dream about. — Eds. American Architect.]

BACTERIOLOGY AND SANITARY PLUMBING.

Philadelphia, Pa., September 22, 1893.

To the Editors of the American Architect: —

Dear Sirs, — Having dropped the practice of architecture for the study of hygiene, and in particular that branch of it called bacteriology, I am led by the decided change in my views, produced by this study, to write you a few lines regarding sanitary plumbing.

The whole system of plumbing, required in all our leading cities, is devised with the idea of keeping out that great bugbear "sewer-gas."

Now the question immediately arises, what is sewer-gas? In order to answer this it is necessary to give a short explanation of the lives and functions of those minute organisms called bacteria.

These are complete organisms consisting of a single cell which live upon organic matter, and excrete other matter. They are divided into two general classes — those that live upon dead organic matter and those that live upon living organic matter. Now those that live upon dead organic matter have many gas-producers among them, that is, they absorb the dead organic matter as their food and excrete nitrogen, carbon, sulphur, hydrogen, etc., or gaseous compounds of these. I can now think of no gas-producing bacteria that produce disease in man. This gas is as harmless as the gases produced in a chemical laboratory. All that is necessary for safety is their dilution with air below a dangerous limit. This explains why men work continually in sewers and remain perfectly healthy.

Take an ordinary waste-pipe in a dwelling-house, the sides up to the parts of the fixtures that are exposed in the room are covered with slimy organic matter, upon which millions upon millions of bacteria are growing. A colony of them which has located themselves below the trap can easily grow up through the slimy matter in the water of the trap to the same matter above the trap, the water in no way impedes their growth, indeed it aids most of them.

Now what we want in a system of plumbing is to keep disease out of the house. The disease-producing bacteria will grow in this slime in the same manner as our friends the bacteria who reduce dead organic matter to simple chemical elements, *i. e.* sewer-gas. Now if these disease-producers are in the sewers, as in an epidemic, or have been introduced into the waste-pipes of a house by the careless disposal of the excreta of a person sick with a contagious disease; what means have we to prevent them from entering our houses? Nothing, except in houses that are provided with fixtures that are easily, amply and continually flushed. Back-vents placed along the lines of waste only add extra surface to grow slimy. Main lines of ventilation, of course, dilute these gases, whose only harm is the power of displacing some of the oxygen in an apartment. Our breath is equally bad.

Cleanliness is our only safety. This applies to the waste-pipes as well as the fixture. Simplicity, of course, promotes cleanliness.

I would drop all back-vents; carry all main lines of waste-pipe through the roof; prohibit by law the use of any fixture that has an overflow that cannot be easily cleaned; provide flushing-tank fixtures and have all surfaces around plumbing accessible for cleaning and made of non-absorbent materials as far as possible.

Very respectfully yours, Clarence O. Arey.

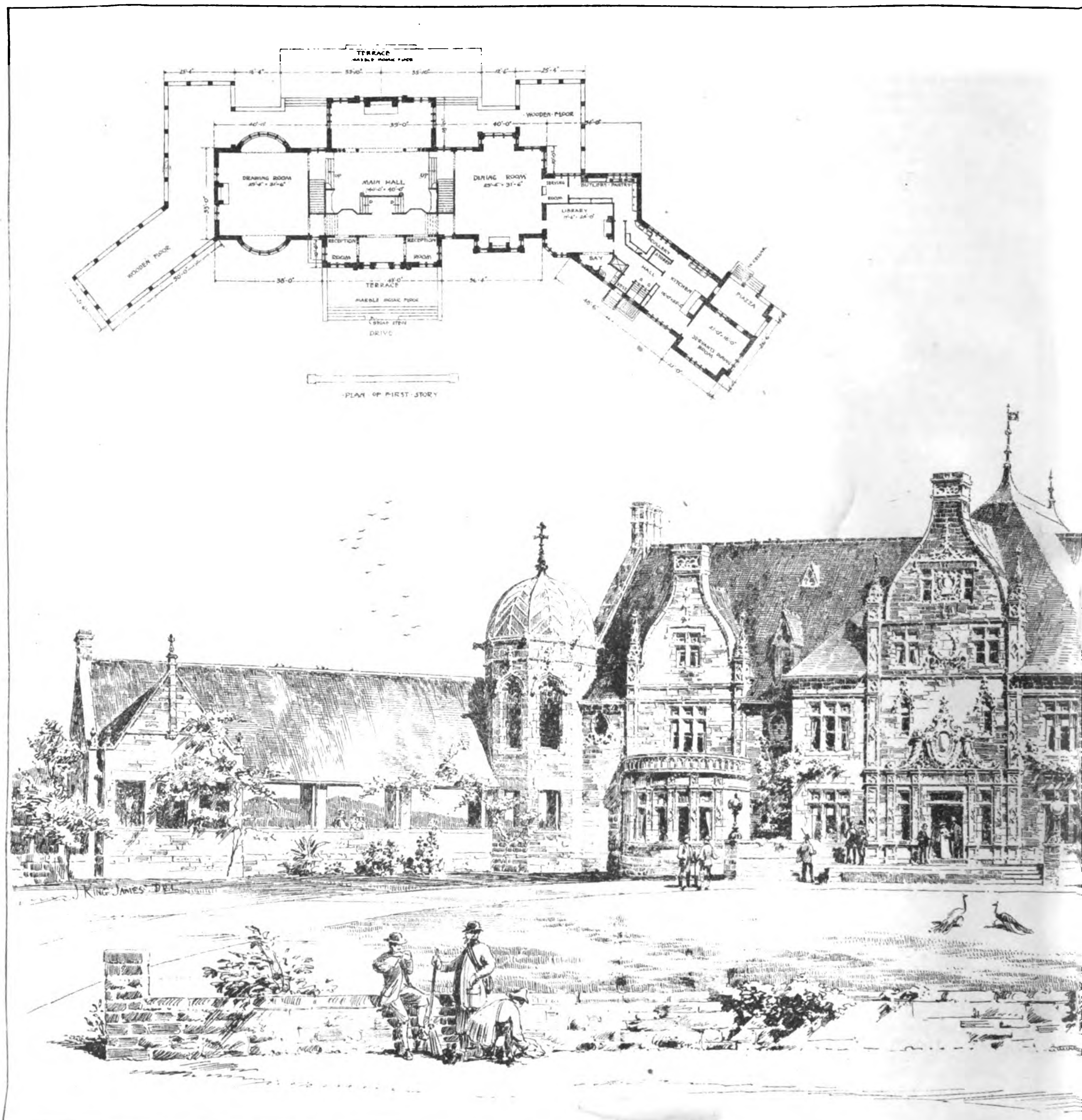
NOTES AND CLIPPINGS

Submarine Foundations made by Solidifying Sand. — Somewhat akin to the process which Mr. Harris used with success on the troublesome section of the Elmwood-avenue sewer for solidifying quicksand is a process by which the sand and gravel at the bottom of a river or the sea are converted into a concrete masonry foundation without being excavated or even disturbed. The process, as described by Fr. Neukirch before the World's Congress of Engineering, consists in using air-pressure to force dry powdered hydraulic cement through a pipe down into the bed of sand or gravel. The pipe or tube has a lance-shaped foot perforated with small holes through which air is forced. The pipe is sunk deep into the sand and gravel bed by forcing air through these holes, which displaces the particles of sand at its foot and allows it to settle. When the tube has reached a solid substratum the cement is fed into the tube, and the current of air carries it to the foot of the tube, and injects it with considerable pressure into the sand and forms a matrix with the sand, gravel and water present. The blowing-in of the cement and air in this mobile mixture produces a boiling action at the end of the tube which thoroughly mixes the cement and sand. As the process goes on and the introduction of the cement continues, the tube is slowly drawn up at a speed which permits the required quantity of cement to be introduced. As the tube is drawn up and the injection of the air ceases, the grains of sand subside and settle firmly together, occupying a smaller space than before the cement was introduced. Each sinking of the tube gives, of course, only a column of concrete, its size depending upon the pressure of the air and the looseness of the sand. To insure the solidity of the whole foundation, the pit is divided into small fields from 8 to 12 inches square, and into each field the pipe is sunk and the requisite quantity of cement forced. To limit sharply the lateral dimensions of the foundations and to protect it against outside influences, it is in the first instance surrounded with sheet-piling or a coffer-dam. — *Providence Journal.*

A German on the World's Fair. — Dr. Julius Lessing of Berlin has been speaking well of the World's Fair. "I was delighted, perfectly charmed. Such magnificence I had not looked for! What splendid buildings! Paris had nothing like it to show. And this is only a young town — a mere infant. Architecture like what I see here the world has not seen since the destruction of the Forum, when Rome was in the very apogee of her greatness. Added thereto is the what I may call aristocratic elegance of the exhibition proper, the absence of all country-fair accessories, which even in Paris were a sort of disturbing element in 1889. Whatever I have so far seen of these marvellous constructions convince me that the overwhelming and inspiring impression made upon me by the Chicago World's Fair will remain an enduring one for life." — *New York Times.*

Those Mammoth Australian Trees. — A story is going the rounds that a gum-tree 415 feet in height has been discovered in the Cape Otway ranges. We must probably take the report as a sign that Australian patriots are recovering from their general depression. Trees of this size were generally believed-in on the faith of current reports accepted by Baron von Müller, till some years ago a photographer advertised for a tree of about these dimensions with the result that nearly 100 feet had to be struck off the accepted estimate. Neither was this because all the finest had been cut down. For the finest generally grow in parts where it does not pay to fell them, and a few landowners have always cared for their preservation. Early explorers were a little rough in their measurements, and these grew with years, though the trees had ceased growing. — *Westminster Gazette.*

S. J. Parkhill & Co., Printers, Boston, U. S. A.



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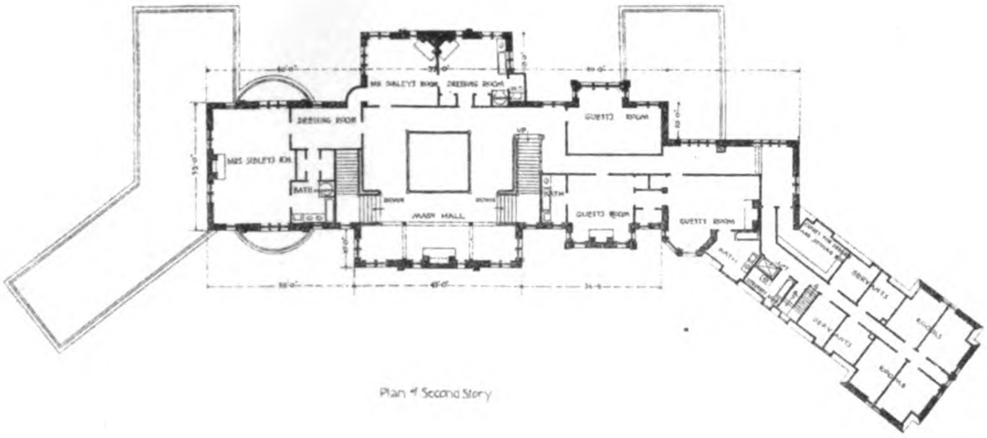

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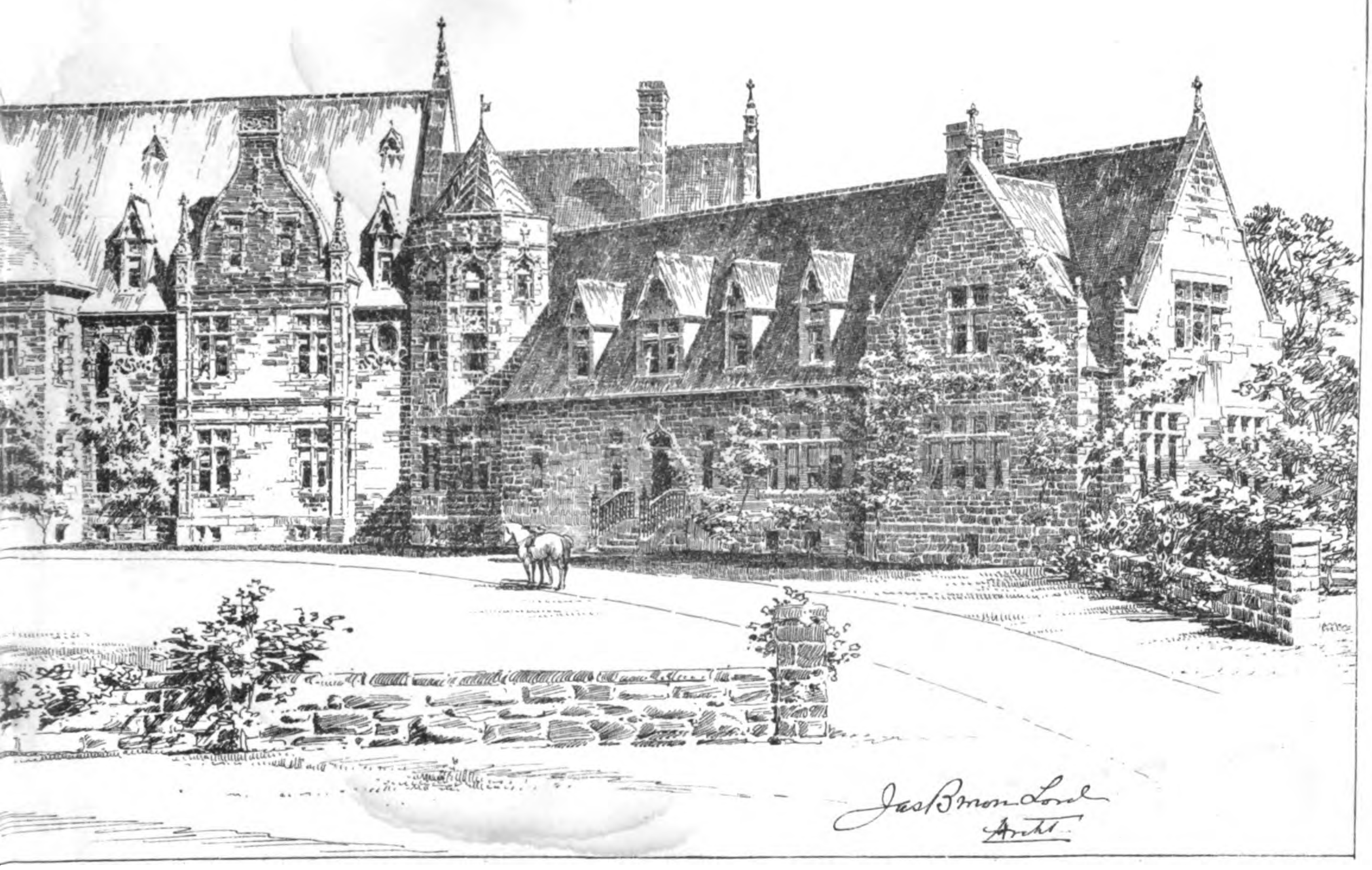

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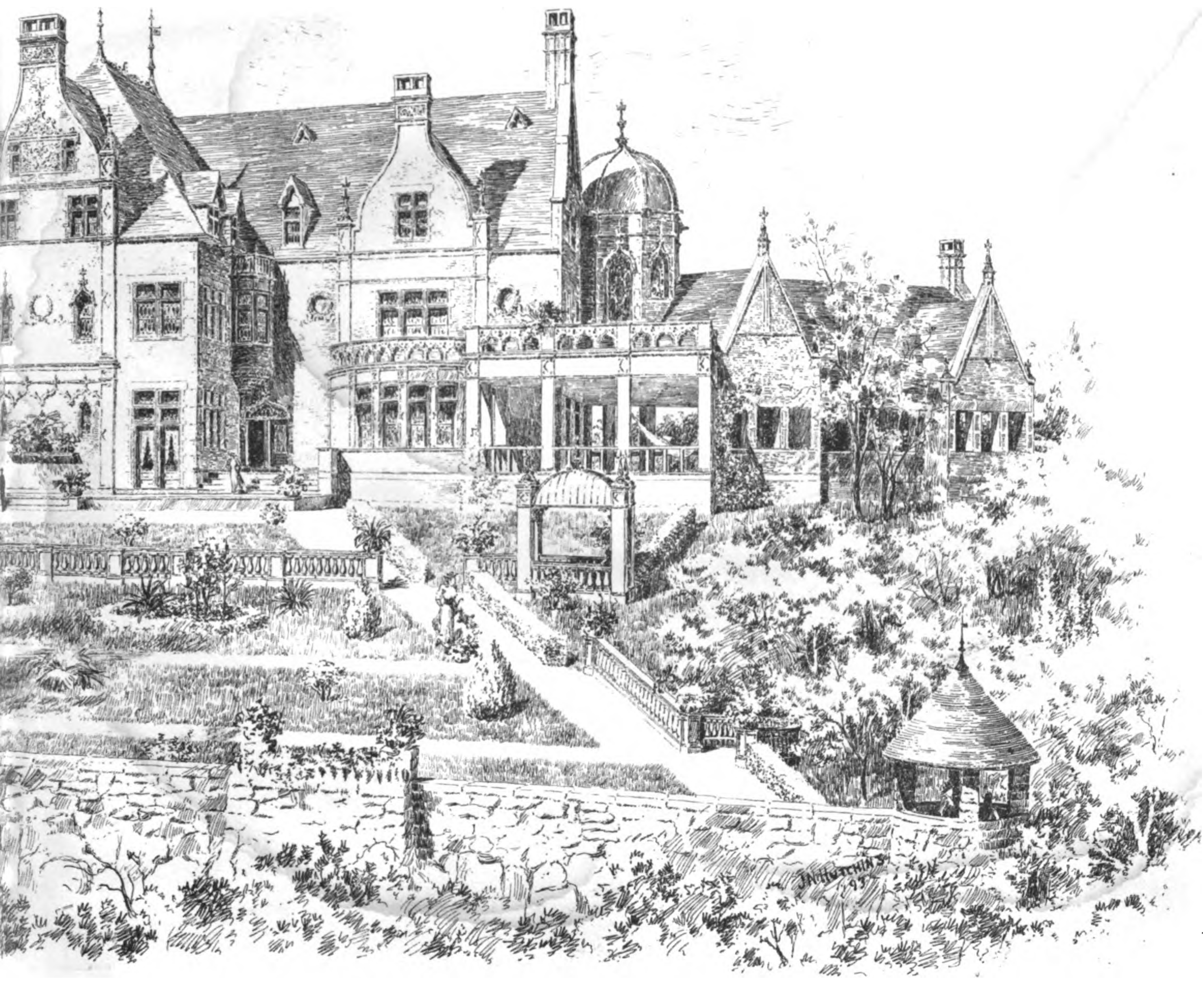

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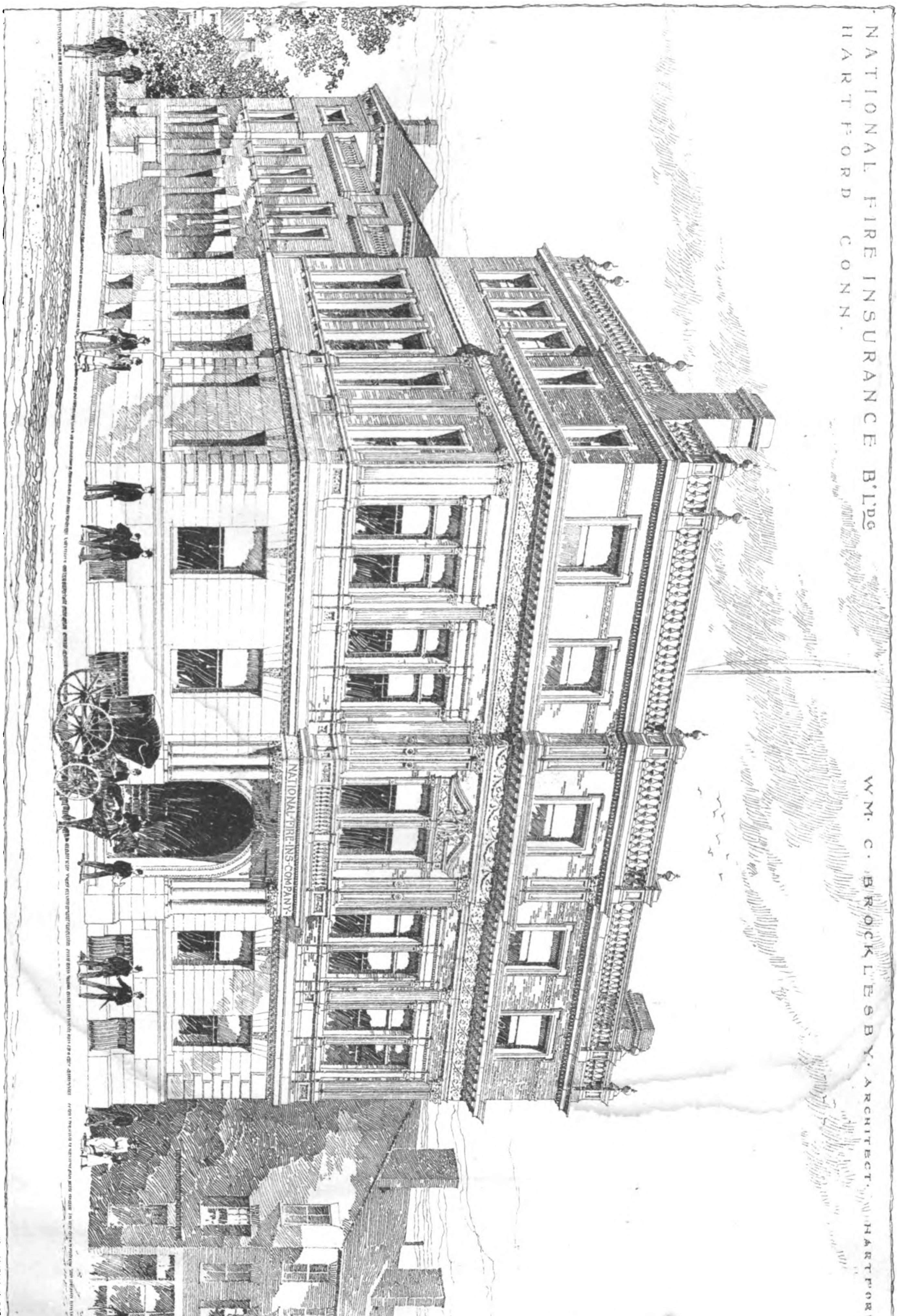
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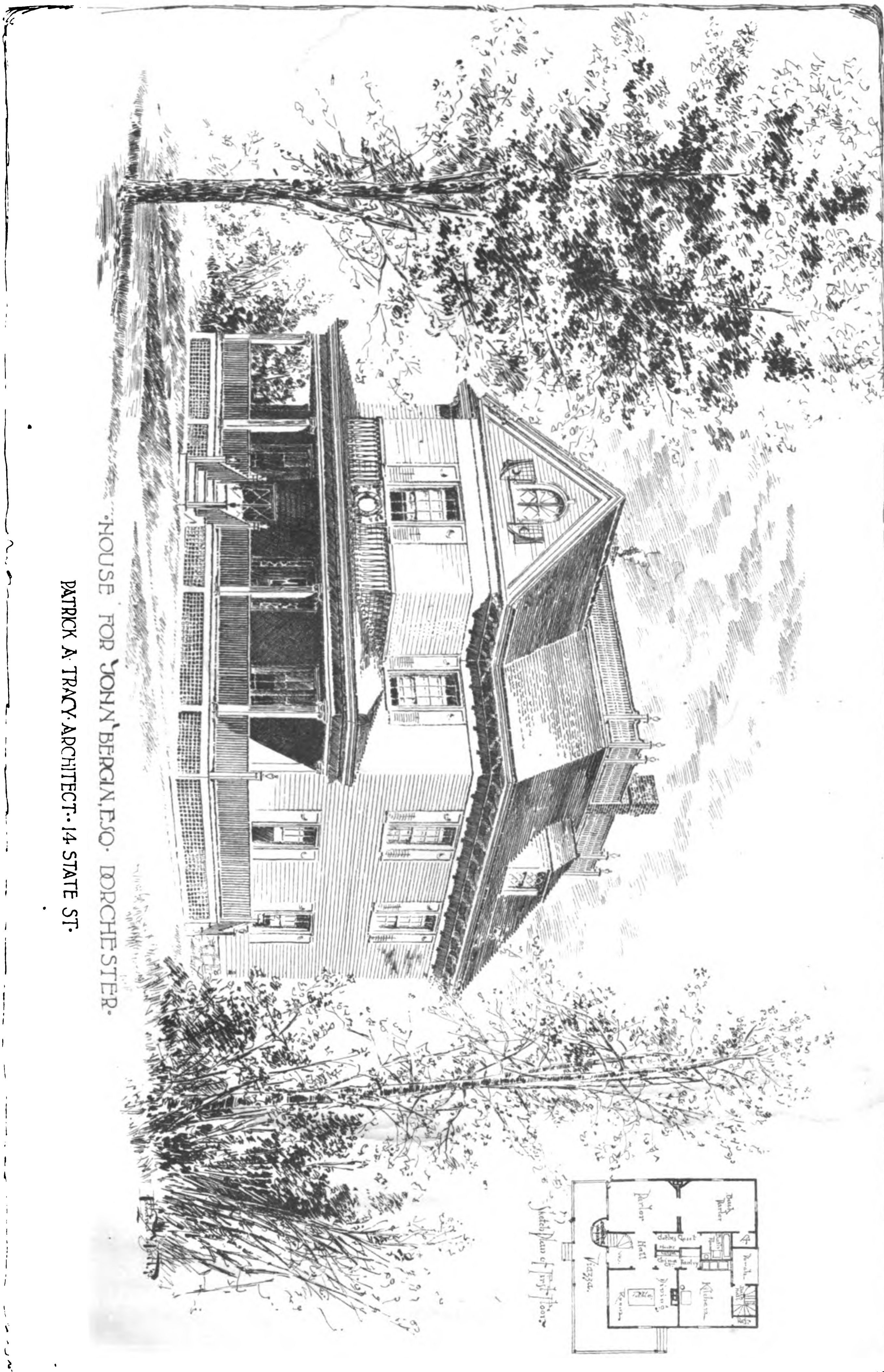

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PATRICK A. TRACY, ARCHITECT. 14 STATE ST.

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OCTOBER 7, 1893.

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A BILL, appropriating seventy-five thousand dollars for removing the Naval Monument, now standing at the foot of Capitol Hill, in Washington, to another part of the city, and erecting a monument to Columbus in its place, was passed by the Senate during the last session, and is now before the House of Representatives, which awaits a report upon it from its Library Committee, to which it has been referred. Meanwhile, the sculptors and architects who have heard of the bill are wondering who is the artist to whom the design of the new monument is to be entrusted. No general information on the subject has been officially given out, but an illustrated weekly recently published a picture of a model, which was described as being under consideration for execution. Who the author of the model was, we do not know, but, as the editor of the journal which published the design characterized it as having a large portion, at least, of the qualities which would render it unsuitable for execution, it seems safe to presume that it did not represent the best that American sculpture is capable of. Whether the author of this model was a volunteer, or was invited to prepare it, and if the latter is the case, on what principle the choice of him was made, are all equally uncertain. The time has rather gone by when the sculptor who had the prettiest curls was the one to receive the commissions for public work, but no very clear system of selection has been substituted for that of appeal to the susceptibilities of Congressmen, and it would seem as if the commemoration of Columbus by a seventy-five-thousand-dollar monument would furnish a very suitable occasion for the adoption of a practice in such matters worthy of the growing greatness of American art.

THE newspapers report that a large number of farmers in Aroostook County, Maine, which was a few years ago almost a primeval forest, are engaged in drilling wells through the rock which underlies the soil. It seems that, until within a few years, sufficient water could be obtained for domestic use from shallow wells, stoned around in the old New England fashion; but since the destruction of the forest by the lumbermen these wells have run dry, and it is now necessary to sink shafts through the solid rock. Worse even than this, it is said that the climate has become so dry that some of the more intelligent farmers are now considering the expediency of drilling deep and large artesian wells to supply them with water for irrigating their farms in time of drought. There is something rather curious and rather melancholy, also, in the idea of New England farmers, who certainly have enough to contend with in their business, being obliged to pump water from artesian wells to irrigate the scanty soil which barely covers their granite rocks, and it does not mend matters to think that they are driven to such a necessity by the ignorance and selfishness of their own fellow-citizens. The economic history of New England, whose first settlers found its fertile soil covered with the finest timber trees in the world, and immediately devoted themselves to exterminating, generally by fire, all trace of this vegetation, and whose descendants then, having converted the moist, fertile soil of their province into dry pasture-land, exhausted it with a few good crops, leaving it a barren waste, from which the present inhabitants are anxiously endeavoring to extract a scanty living by cultivating on it a few stunted specimens of the very tree which their great-grandfathers took so much pains to destroy, would be the marvel of the world, were it not that it has been repeated in nearly every State in the Union. Possibly it may occur to the Aroostook farmers that if their fathers had exerted their influence to have the forests of the United States put under intelligent official protection, they would not now be pinching themselves to pay for artesian wells to preserve themselves from thirst and their land from barrenness; and if this reflection should suggest to them the advisability of using their own influence to have the lands now waste replanted by the public authority, for the benefit of their children, their experience will not have been in vain.

A TRADES-UNION Congress was recently held at Belfast, Ireland, in which resolutions were adopted, indicating the sort of legislation which would be acceptable to the unions, in case they should ever have a chance to dictate in such matters. One of the most interesting of the laws which the Congress thought necessary was one by which the Government was obliged to provide employment for all unemployed persons, so that, in case of a strike in any trade, no one could be had to take the place of the strikers, and they would have their employers at their mercy. In addition to this, it was decided that the military ought, under no circumstances, to be allowed to interfere with riotous strikers. Evidently, with the employers prevented by law from getting any one to take the place of strikers, and left outside the protection of the public force, so that they could be hung, drawn and quartered, or simply tortured, as the interests of "labor" seemed to require, the millennium of the walking-delegates would be near at hand. Whether the people not belonging to the unions would find this state of affairs so pleasant is another question. It would not take long, under such a régime, to exterminate the whole race of private employers, leaving the Government the only employer, and the Government itself compelled to employ everybody. As the Government, in all civilized countries, consists practically of the citizens themselves, it follows that every one would have a claim on every one else for employment, and society would resolve itself into a simple struggle between the strong and the weak.

IT is curious that newspapers and politicians do not see how reactionary and subversive of all idea of liberty the trades-union system is. The whole of modern social progress has been in the direction of preventing the rich, strong and arrogant from oppressing the poor and weak, and a great deal has been accomplished. In the United States, at least, no nobles can obtain public employment in preference to the sons of workingmen; no rich man can bribe a judge to decide against a poorer opponent, and, until recently, no strong man could with impunity keep a weaker one, by blows and violence, from earning his daily bread. Now, however, the fashion has changed. Small bodies of delegates, professing to represent "organized labor," boldly threaten legislators unless laws are passed to give them advantages over other people, combine to cause extensive disaster unless their demands are complied with, and concoct all sorts of persecution and violence against free-born citizens who do not choose to submit to their will; yet the newspapers and party politicians vie with each other as to which shall be most obsequious to the inflated magnates of these mediæval associations. There seems to be reason for supposing that the union system is, in the United States, at

least, on the decline, and he is no friend to the Republic who does anything to revive or render respectable one of the worst systems of tyranny that has ever infested any country.

THE prospect of railroad communication between New York City and the New Jersey shore seems to be rather distant, and there is no present prospect of its getting nearer. The Hudson River Tunnel Company, after constructing one tunnel nearly across the river, and making considerable progress on another, has been thrown into the hands of a receiver. The securities of the company are said to be mostly held in England, and it seems doubtful whether the work will be completed for many years, if at all. Besides the tunnels, two bridges have been designed to cross the Hudson River. One is a suspension bridge, and the other a cantilever. Both the schemes have been approved by the officials at Washington, and permission to carry them out will probably be given, but, as they are in charge of two different, not to say rival, companies, there is likely to be difficulty in securing the execution of either, unless the two companies should find some way of consolidating their interests.

THE New York *Sun* mentions a case involving a contract, which was decided a few days ago in Buffalo, by the Superior Court of the county. A man hired a team of horses, under a written agreement, which stipulated that upon one day's notice he should return the horses in the same condition that they were received. While they were in his possession, one of them was taken sick and died. The owners of the horses sued to recover the value of the horse, the lessee being unable to return the animal itself, but were defeated, the Court holding that the parties to the contract did not contemplate compliance with it on the part of the defendant, unless the horses mentioned in it should continue to exist, and as one of them had ceased to exist, from causes for which he was not responsible, as it was not alleged that the death of the animal was due to his fault, he could not be required to pay damages. The *Sun* compares this case with that of a builder who agreed to finish and deliver a house on a certain day, but was prevented by reason of the destruction of the building by lightning, and appears to think that there is a peculiarity about horses, which exempts them from conditions which would apply to inanimate objects; and cites from Benjamin's book on sales, in which it is said that "If A agrees to sell and deliver his horse Eclipse to B on a fixed future day, and the horse dies in the interval, the obligation is at an end," observing that "this illustration is directly applicable to the Buffalo case." With all possible respect for the *Sun*, we cannot think that Mr. Benjamin's illustration is at all suitable to the Buffalo case. A, in Mr. Benjamin's story, agrees to sell a certain horse, namely, Eclipse. When Eclipse dies, the parties to the contract are put back into the same condition that they would have been in if he had never existed. If, however, instead of Eclipse, A had agreed to deliver a horse of a certain value, without mentioning any particular one, he would not be excused from fulfilling his contract by the death of the one which he had in his own mind intended to sell. But if he would be bound to deliver some horse of the value specified to the purchaser who had agreed to pay a certain price for him, he would be still more bound to do so if the purchaser had paid the money in advance; and this was virtually the case at Buffalo. There is no more familiar rule than that if any one borrows or hires a piece of property, and it perishes in his hands, he must return a satisfactory substitute for it. If the Buffalo teamster had hired carts instead of horses, there would have been no doubt about his duty, in case one of the carts had been accidentally destroyed, and the real question before the Court seems to have been whether, in case of a contract relating to horses, which are goods of a peculiarly perishable kind, the risk of their remaining alive should be borne by the lessor or the lessee. This would be a question of the interpretation of the actual contract, and the court undoubtedly interpreted it correctly.

PROFESSOR JULIEN, of Columbia College, writes to the New York *Times*, proposing that the Egyptian obelisk in the Central Park should not only be protected by a metal cap over the top, as has been several times before suggested, but that the hieroglyphics should be gilded. What is most curious, however, is that, as Professor Julien says, these changes would restore to it the appearance that it had when originally set up in Egypt. According to him, the obelisks in Egypt were always furnished with a cap of gold or gilded metal, to reflect the rays of the sun, which the obelisks in some way symbolized, and he says that investigation shows that the intaglio hieroglyphics on most of them were either gilded or filled in with gold. Unfortunately, the rose-colored granite of the New York obelisk has faded so that the effect of the gold would not be quite what it was five thousand years ago; but it would certainly be interesting, and, with all its surfaces, except those nearly vertical, covered with impervious metal, the future preservation of the stone, for several hundred years at least, would seem to be assured.

AN Exhibition of Hygiene was recently held in Havre, and the managers of the affair had the good sense to leave the arrangement of the exhibits pretty much in the hands of the architect, M. Léon David, to whom, indeed, the original idea of the exhibition was due. M. David seems to have carried out his task with the zeal of an enthusiast, joined to the fertility of resource and eye for effect of a well-trained architect. Among other things, he prepared two types of houses, one sanitary and the other insanitary. In the latter, the errors of design and fault of execution, which, apart from the situation, help to render a house unwholesome, were shown to the life, even the spiders, cockroaches and other insects which harbor in damp and ill-built habitations being presented for the edification of the visitor. Just how M. David would construct a house which spiders and cockroaches could not enter we are not informed, but his models at least showed that hollow, unventilated spaces are favorable to the development of vermin.

ONE of the most interesting things shown in the exhibition was an apparatus for purifying sewage by electricity. It will be remembered that some experiments have been made in New York for purifying Croton water by treatment with electricity; but MM. Hermite & Company, at Havre, have undertaken a much more difficult task. The theory seems to be that, by electrolyzing a small part of the water, its constituents are disengaged in a condition in which they can act powerfully on the organic impurities contained in it. In the case of the Croton water this result seems to be successfully attained, but MM. Hermite & Company extend the principle by electrolyzing sea-water, portions of which are disengaged in such a form as to render the whole liquid a powerful disinfectant, which, on being mixed with sewage, destroys the organic matter present. In practice, MM. Hermite & Company, under the contract which they have already made with the city authorities of Havre, place electrical apparatus on the streets, which supply electrolyzed sea-water in large quantities. This liquid is allowed, at intervals, to run into the gutters, which it instantly disinfects, and then passes into the sewers, where it continues its purifying action. It must be confessed that the idea of using water from the docks as a disinfectant for seaport towns is adapted to excite some incredulity, but, to show its efficacy, MM. Hermite & Company have arranged to discharge a small quantity into the basins of several water-closets in the City-hall of Havre, and *L'Architecture* says that the matters in the basins are instantly dissolved into an almost inodorous liquid.

DIRECTOR BURNHAM is credited with an available idea for disposing of the World's Fair buildings. Knowing, as any architect would, that the cost of tearing down the buildings would be far more than the materials would be worth, he suggests that it would be economical, and perhaps profitable, to burn them after the exhibits are removed. He proposes to burn one at a time, setting them on fire at night, and charging fifty cents admission to the fair grounds for each occasion. If they burn briskly, the sight would undoubtedly be well worth the price of admission, but we imagine that the satisfaction of the architects, exhibitors and insurance men, who supposed that the "staff" construction was nearly fireproof, will be in inverse proportion to that of the spectators. Mr. Burnham thinks, with reason, that the steel roof-trusses, which are the most valuable part of the buildings, would not be materially injured by the fire, and it will be all the easier to take them down after the combustible surroundings are cleared away, and the lime and plaster rubbish, of which there will be vast quantities, will then be in tolerably available shape to be used for filling along the lake front, which is said to be their destination.

OFFICE-HELP FOR ARCHITECTS.[1]—XIX.

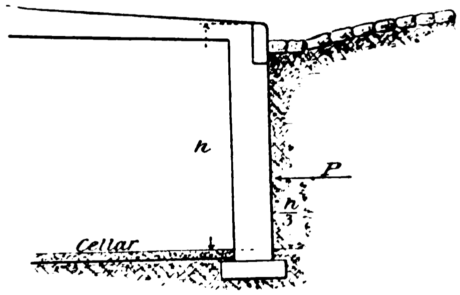

Fig. 78.

SECTION II.—

§ 257. Walls: *Sizes:* — Sizes of foundation-walls and piers will be given fully in Chapter VIII.

§ 258. Vault-walls: — A special case of retaining-wall.

The walls must resist:

(*a*) The horizontal effect of the earth-thrust.

(*b*) The vertical effect of the sidewalk load, or that of the superimposed earth.

The effect of load (*a*) on a wall with a vertical inner face (of approximately rectangular section) is to set up tension in the inner face of wall ∴ for stability the effect of (*a*) in creating tension on the inner 8″ of the wall should = or < the effect of (*b*).

The horizontal effect of the earth-pressure against any wall of approximately rectangular section is as follows:

Assumption: — Consider section 1′ 0″ long. Weight of material or earth against wall, 140 pounds cubic feet. (Fig. 78.)

Angle of repose of material, 30°.

t = thickness of wall in feet.

h = height of wall in feet.

P = horizontal component of pressure.

Then

$$P = \frac{h^2}{2} \times 140 \times .288 \qquad (54)$$

$$= h^2 \times 20.16.$$

P may be resisted in three ways:

First. — If walls across the vault, each 10′ 0″ are practicable by connecting these walls with horizontal arches five rowlocks thick, and 18″ rise, or arches of hollow fire-clay of 12″ rise (Fig. 79).

Or Buttresses may be built to resist the thrust, and arches built as outlined.

(For proportioning buttresses, see Chapter VIII.)

In proportioning, P from Formula (54) must be converted to the pressure per square foot at the bottom of the arch, and then L found by multiplying by l, and for a section 1′ 0″ high, $L = L^{\square} l$, thus:

$$\text{Maximum } L = \frac{P \times 1.5}{h} \qquad (55)$$

Then proportion the arch from Chapter V, or the necessary thickness of the arch may be taken from Tables of Flat Arches in Chapter IX.

Second. — Where walls are more than 10′ 0″ high, from underside of sidewalk beams to finished cellar bottom, it is probably more economical of money, and certainly more so of space, to support each sidewalk beam with an I-beam column, and connect the columns with either flat or segmental arches. In this case the columns would be proportioned so that the upper flanges shall have an area sufficient to resist the compressive strain due to the pressure from the earth, and in addition sufficient area to resist the compression from the sidewalk beams (See Chapter IV) Figure 80; the earth-thrust being assumed as concentrated at $\frac{1}{3}$ h and of amount = P.

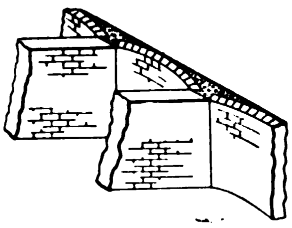

Fig. 79.

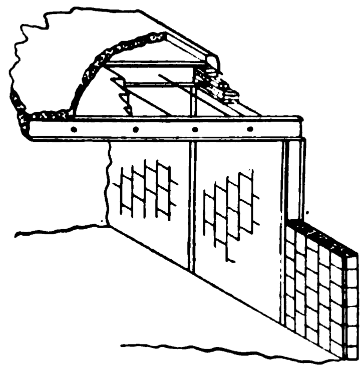

Fig. 80.

The bases of the columns should be proportioned as per Section III, "Footings."

Third. — Where walls are less than 10′ 0″ high in the clear, or when the vault is divided into basement or sub-basement, so that the clear height is 10′ 0″ or less, the pressure may be resisted by means of rectangular walls.

In this case, as in all other cases of earth-pressure against a vault wall, the pressure due to the earth is assumed as concentrated at one-third the height of wall above the bottom; its bending-moment then at this point, the upper edge being assumed to be held by the sidewalk beam, is

$$M = \frac{P \times \frac{1}{3} h \times \frac{2}{3} h}{h} = 20.16\, h^2 \times h \times 0.22 = 4.46\, h^3 \qquad (56)$$

This is resisted, first, by the weight of the wall multiplied by its lever arm or

$$W = 70\, h\, t^2 \qquad (57)$$

and second, by the effect of the sidewalk load which produces compression on the inner 8″ of wall, and is

$$C = l \times 100 \times (t - .33) \qquad (58).$$

Then we must have for equilibrium

$$M = W + C.$$

If the wall fulfil this condition, it may be considered safe.

Any wall to resist the frost-thrust must be at least 12″ thick, and for wide sidewalks, to be safe against shocks, should be 16″ thick.

On this basis Table XXXII has been computed.

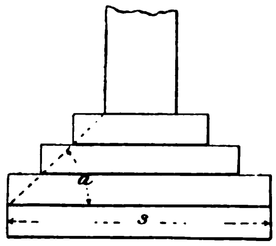

Fig. 81.

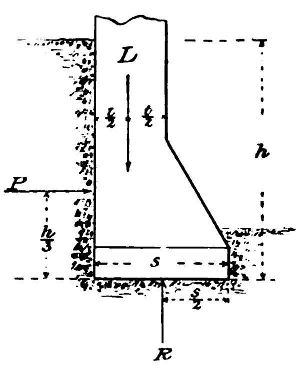

Fig. 82.

The inner faces of all walls should be vertical, the walls decreasing in thickness if desired, proportionately, on the outside.

If there are stories in the cellar, the effect of the floors is to stiffen the vault walls, and they then should be proportioned as

[1] By George Hill, Consulting Engineer. Continued from No. 926, page 182.

ABBREVIATIONS AND SYMBOLS.

= equal to.
|| parallel to.
÷ divided by.
× multiplied by.
+ added to.
a^2 a multiplied by itself.
$a > b$: — a greater than b.
$a < b$: — a less than b.
$\frac{a}{b}$: — a divided by b.
∴ therefore.
□′ square feet.
□″ square inches.
8# read 8 pounds per lineal foot.
[channel bar.
I I-beam.
T T-iron.
L angle iron.
deck beam.
● round section.

I ton = 2,000 pounds as this is the conventional ton, the legal ton is 2,240 pounds, but is rarely used.
l = the length between supports of any beam or girder or height of any column, always in feet.
b = breadth of any beam or girder, always in inches.
d = depth of any beam or girder, or the least transverse dimension of any column, always in inches.
L = total load uniformly distributed coming on any piece in pounds.
$L^{\square'}$ = " " " " per square foot in pounds.
W = concentrated load on any piece in pounds.
s = span of any arch or truss between centres of end pins in feet, or spread of footing courses.
A = area of any section in square inches.
M = maximum bending-moment in inch pounds.
n = distance of centre of gravity of section from either top or bottom edge in inches.
I = moment of inertia, neutral axis through centre of gravity.
R = moment of resistance of section.
r = radius of gyration, in inches.
Sc = safe compressive strain in pounds per square inch.
St = " tensile " " " " " "
Ss = " shearing " " " " " "
S = strain per square inch in extreme fibre.
P_e = upward reaction of support at left-hand end of beam.
P_f = " " " " " right " " " "
e = distance of centre of gravity of load from left hand of beam.
f = " " " " " " " " right " " "

though their depth were the distance from sidewalk to basement beams, and for each additional story in depth increase the the thickness 4″.

Sizes:—Are for brickwork in hydraulic-cement mortar. For stonework use same thickness, but make minimum thickness 18″.

TABLE XXXII.

THICKNESS OF VAULT WALLS, AT BOTTOM FOR VARIOUS DEPTHS, h, AND FOR VARIOUS WIDTHS OF SIDEWALK l.

h	$l=12'$	$l=16'$	$l=18'$	$l=20'$
4′	12″	12″	16″	16″
6′	16″	12″	16″	16″
8′	20″	16″	16″	16″
10′	28″	28″	24″	24″
12′	36″	36″	36″	32″
14′	48″	44″	44″	40″
16′	56″	52″	52″	48″

§ 259. Piers:—Weight on piers should be carefully computed (see § 251). Size for first-class brickwork in Rosendale cement should be such that load = 10 tons per square foot. If permitted, have them built with every joint filled with mortar (no grouting) and without bond-stones. Cap with blue-stone or granite of thickness = the projection of stone beyond the steel or iron base.

Make base so that load on cap-stone from it = 60 tons per square foot. Height of piers should never exceed eight diameters.

SECTION III.—

§ 260. Footings: *Materials:*—Should be of rigid, imperishable nature: brick, stone, concrete, metal and occasionally wood (treated of under "Substructure").

Footings are intended to receive the load from the walls at their top, at an intensity of about 10 tons per square foot, and distribute it over the natural material, reduced to about 4 tons per square foot.

§ 261. Proportions:—Are fixed primarily by the requirements of the sub-strata.

$$\frac{\text{Total load from § 251 for soils}}{\text{Bearing-value, Table XXIX}} = \text{Spread of footings.} \qquad (59)$$

And for piles,

$$\frac{\text{Total load from § 251}}{\text{Bearing-value of piles, Table XXXI.}} = \begin{matrix}\text{Number of piles}\\ \text{per lineal foot.}\end{matrix} \qquad (60)$$

Spacing of piles will be fully treated under "Substructures," § 270, which see.

The width of spread being determined, the material and proportions will be determined by limitations as to

(*a*) Allowable width.
(*b*) Allowable height.
(*c*) Allowable time for construction.
(*d*) Cost of materials.

Generally, the angle a Figure 81 will be as per Table XXXIII.

TABLE XXXIII.

INCLINATION OF FOOTINGS.

For metal footings	— 75°	3′ 9″ batter per foot.	
" stone "	— 60°	1′ 9″ " " "	
" concrete "	— 45°	1′ 0″ " " "	
" brick "	— 30°	0′ 7″ " " "	or $1\frac{5}{8}''$ per course.

All footings should start with a vertical portion 16″ high.

With the material on the ground, footings can be constructed in point of least time in the following order: metal, brick, concrete, stone.

As to cost under usual conditions, least cost will be for brick, then concrete, metal, stone.

Usually there will be limitations coming under one of the four heads given above, which will narrow down the conditions, so as to leave but little choice.

Where only the best results are sought, the writer believes that brick should be used, since in brickwork, the effect of poor work on the part of the mechanics is least felt.

§ 262. Brick Footings:—Should be of the best hard common brick, or common hydraulic pressed brick, laid in Rosendale-cement mortar, one cement to three sand, carried up one course at a time, with all of the joints of the two outer courses filled full, then the space between them filled half-full with mortar, and the bricks pushed into place, with a sliding motion, so that the mortar will be pressed up, and fill the joints.

Especial care should be taken with the bonding, so that each brick may bear on at least two bricks below, and if practicable

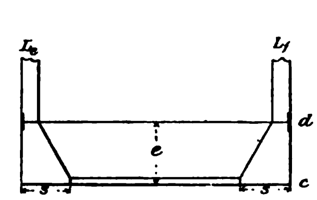

Fig. 83.

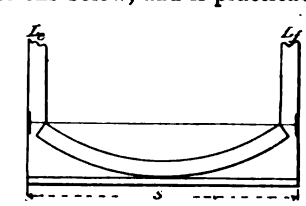

Fig. 84.

on four, and the bonding should be carried back through the entire thickness and height of the footings, excluding all bats except such as are necessary for closures. The laying should proceed as follows:

Spread a levelling course of cement-mortar 2″ thick.

FOR WALLS 24″ THICK OR OVER.

First Course:—One row of headers on each face, then a row of stretchers, then alternate headers and stretchers to a closure.

Second Course:—One row of stretchers on each face, starting with a ½ brick, so as to bring the first brick overlapping on three, then a row of headers, then alternate stretchers and headers to a closure.

Third Course:—Same as first.

Fourth Course:—Same as second.

Fifth Course:—Same as first.

Sixth Course:—Same as second. These courses vertically over one another. Then begin racking back $1\frac{5}{8}''$ for each course until thickness of wall is reached.

Seventh Course:—Same as first.

Eighth Course:—Same as second, and following out in the same way until the wall thickness is reached. The last course of the footings, or the first course of the wall should always have header courses on the outside.

FOR WALLS LESS THAN 24″ THICK.

Proceed as above described, making only three courses vertical.

Exception:—Treat chimney-stacks 60′ 0″ high or over as though walls were 24″ thick.

Make the footings for all walls symmetrical on both sides wherever possible.

§ 263. Unsymmetrical Masonry Footings:—

P = Earth pressure. (Formula 54.)
L = Load from wall. (Tons.)
R = Upward reaction from earth = L.
$a = \frac{1}{3}h$ or $\frac{1}{3}$ of depth of footings below grade.

Then for equilibrium we must have, (Fig. 82).

$$L\left(s-\frac{t}{2}\right)-\frac{Rs}{2}=\frac{Pa}{2{,}000} \qquad (61)$$

a should never be more than t above the footings, and should also be as high up as possible—remember also that L and R are

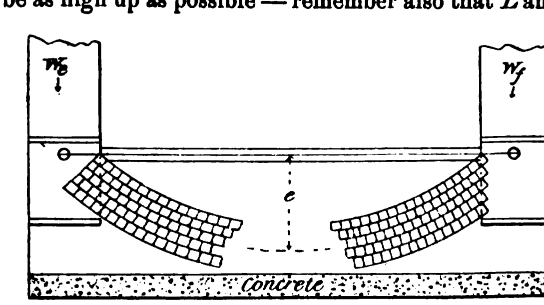

Fig. 85.

in tons and P in pounds. Substituting the values of P, R and a, we have

$$h=5.3\left[L\,(s-t)\right]^{\frac{1}{2}} \qquad (62)$$

Where this gives impracticable results for h (as it will for heavy buildings) two courses are open:

First. — Arrange the footings of two walls or piers, carrying the same weight as nearly opposite as possible; extend a bed of concrete 16″ thick from one to the other at c, and connect the parts at d with tie-rods or beams forming the flooring, making the area of tie-rods in square inches A according to formula.

$$A = \frac{L\,(s-t)}{16\,e} \qquad (63)$$

The anchor-plates holding these ties into the walls should be placed as far from d as possible, and should have ½ square foot of area for each square inch of A. These results are for one lineal foot of wall; the distribution may be made to suit each case, but the tie-plates should be spaced apart not more than 2 t (Fig. 83) in the clear.

Second. — A series of inverted arches may be constructed either in metal or masonry (Fig. 84) connecting walls or piers of nearly similar weights:

For Walls: — If

$$R = \frac{P_e + P_f}{s} \qquad (64)$$

it is safe to found on the soil. If R is less, then piling or some other method must be resorted to to increase R to the value required to fill the conditions of (65) for walls.

For Piers: — The spread of footings under the arch may be increased by means of I-beams or rails to almost any desired depth (see "Metal") then, calling the spread in the other direction w, we have

$$\frac{W_e + W_f}{s\,w} = R\square' \qquad (65)$$

To Proportion: — Make arch a segment of a circle.

Make e as great as possible.

Make skew-backs of cast-iron dipped in hot asphalt, and coat with hot asphalt after setting, two coats.

Make pins and tie-rods of steel, and paint with metal paint, hereinafter described, one coat before setting, and three coats afterwards.

Make A = total area in square inches of tie-rods per foot of wall or for pier.

$$A = \frac{s}{64\,e}(L_e + L_f) \qquad (66)$$

Make $A\,v$ = total area in square inches of masonry in inverted arch

$$A\,v = \frac{s}{2\,e}(L_e + L_f) \qquad (67)$$

and make masonry of first quality hydraulic pressed brick, laid in Rosendale-cement mortar. If $A\,v$ = total area in square inches of steel in inverted arch,

$$A\,v = \frac{s}{80\,e}(L_e + L_f) \qquad (68)$$

In Steel: — Proportion depth of arch to fill the following conditions:

(*a*) Use I-beams for the compression member.

(*b*) Beams should be distance apart in clear = width of flange.

(*c*) Total width across beams = width of pier, or twice width of columns.

(*d*) Use a medium weight of the height of beam decided on, say 10% less than the maximum weight rolled.

The area of metal in a horizontal plane in the vertical ribs of the skew-back must be in square inches

$$A = \frac{L}{4} \qquad (69)$$

No rib less in thickness than 1″.

Area of pin and size of eye-bar must be taken from the tables.

In setting, spread the footing-course over and compact carefully. After two days, pick the surface over, wash with a hose, and then lay concrete to the exact shape of the arch, carrying up at the ends to the height determined for the bottom of the skew-back.

Carry up all this work as nearly simultaneously for one arch as possible; then spread a thin layer of hot asphalt over the arch, if for metal (omit this for masonry); then bed the bottom skew-back plate in Portland-cement mortar; bed the bent beams forming the arch in the same mortar. When all the beams are in, slip in the pin, fill the space around and between them with hot asphalt; then draw the pin, insert the tie-rods, slip in the pin and draw tight. The ends of the beams and their seats must be planed.

For Masonry: — Carry up the rowlocks in cement, taking especial pains to have all the joints filled full. Bed well against the skew-back, put in tie-rods, and bring them to a bearing against the pin.

All this must be done with great care, no undue strain being brought against the pin; the skew-back must rest evenly on its plate, and the plate evenly on the arch; the continuation of the centre line of the arch must pass through the centre of the pin; the skew-back surfaces must be exactly radial and exactly the same on each side of the centre line.

In proportioning a foundation in this manner, the service of an engineer should be obtained to check all of the computations before the work is let, so as to be absolutely certain that no error has been made.

§ 264. Stone Footings: — For walls 24″ thick, or more, footings should be of granite, trap, limestone, dense marble or very dense sandstone.

Courses should be from 15″ to 24″ high. Stones should be laid out as large as practicable, departing in no case more than 4″ from the dimensions given, beds and builds parallel and plane. (Fig. 86.)

Projection should be one-half the built-in portion of the stone, and as given under § 261.

Top stones should be through-stones. Bottom courses should start on a levelling of concrete 6″ thick, each stone should be bedded in a fresh-mixed bed of cement, and the stone so bedded as to have every void below it filled. All joints should be filled full of Portland-cement mortar well rammed in. Each stone should be washed with a hose immediately before being

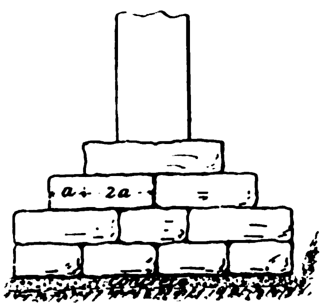

Fig. 86.

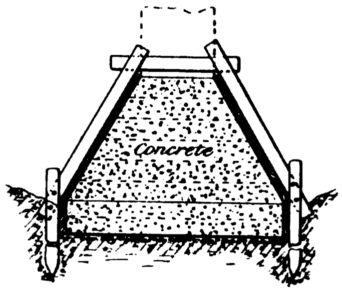

Fig. 87.

set. The mortar used must be freshly mixed, and the stones thoroughly bedded.

For walls less than 24″ thick, footings may be of any of the above, or any good ledge stone from 15″ to 24″ thick. They can often be made in one course, in which case thickness should equal projection beyond wall. They should be thoroughly bedded in cement-mortar spread over 2″ of concrete, and the top levelled off with spawls in cement-mortar to start the wall.

All the precautions noted for the heavier foundations should be observed for this case.

Generally: — Stone foundations require greater care and better workmanship than those of brick.

§ 265. Concrete Footings: — For walls 24″ thick or more, batter as per Table XXXIII.

Part a should be vertical, and 12″ to 18″ high, built-up in two or three layers well consolidated by rammers.

The batter can be obtained by putting in 2″ × 6″ studs, 6′ 0″ c to c, to the batter given, securing them at the top, bedding them in soil at the foot, and putting in 2″ × 8″ plank on the sides (Fig. 87). On the completion of the work the whole is readily removed.

For walls less than 24″ thick, make rectangular in cross-section, making thickness 1.50 projection on one side.

For mixing, setting, etc., see Chapter I.

§ 266. Metal Footings: — One method of using metal has already been described under § 263.

Another method, and one much used in the West for the support of columns, is to build a crib of I-beams and steel rails, entirely filled-in and surrounded with concrete.

This style of foundation depends for its stability on one of two assumptions:

(*a*) That the concrete causes the several courses to act together like a built beam, which is absurd.

(*b*) That the metal is strained beyond the elastic limit, which is dangerous.

Where it is desirable to minimize the height occupied by the footings and gain a wide spread, use all steel, and proceed as follows:

Let W = load at the foot of the column in tons.

L = load per lineal foot of the wall in tons.

B = safe bearing-value of the soil per square foot in tons.

C = the coefficient given in Table VII.

D = depth of the girders, or distance from the centre of the tie-rod to centre of arch in inverted arches, in feet.

x, y, z = variable dimensions in feet.

c = spacing of the beams, centre to centre, in the bottom course, in feet.

§ 267. Column Footings: *First Method:* — Where columns are arranged symmetrically, so as to be in pairs. (Fig. 88.)

Girders may be assumed as supported at each end and uniformly loaded with a load equivalent to the combined weight on the columns, and would be proportioned according to Chapter III, provision being made at the end to take up the shear of the column, and the flanges being made as broad as possible. The spread of the beams beneath will be found from the formula

$$W_{,} + W_{,,} = B\,y\,(2z + x) \qquad (71)$$

y being necessarily the spacing of the columns, out to out.

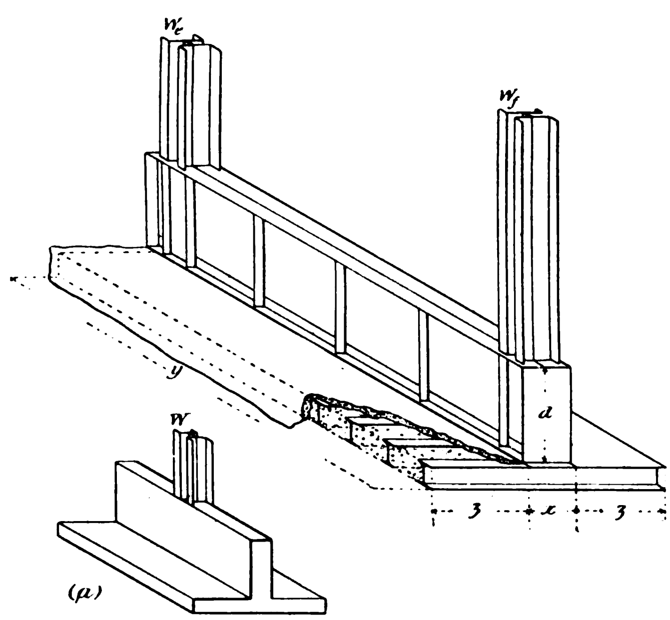

Fig. 88.

$2z + x$ is determined at once. Practical conditions will determine x which is the width of the girder flange, and then z can be readily found.

The size of the beams required for z is found by the formula

$$R = \tfrac{3}{4}\,B\,c\,z^2 \qquad (72)$$

c should not exceed four times the depth of the beams used for the spread.

For isolated columns, the footings shown, Figure 88 (*a*) can be used, the girder being proportioned then as one fixed at one end, free at the other and uniformly loaded, for each half of its length.

Second Method: — To support the load W, we must have,

$$W = B\,(2\,x\,y\,z) \qquad (73)$$
$$y = 4z \qquad (74)$$
$$y = x = 4d \qquad (75)$$
$$W = 24\,B\,z^2 \qquad (76)$$

The size of beams required for any projection x will be governed by the spacing of beams or rails, c to c, which must not exceed four times depth of beam; thickness of concrete under beams or rails must equal width of bottom flange. Thickness of concrete + height of beam or rail + d must not exceed the height that can be allowed for the footings. Then the size of I-beam or rail required for projection is as given in Formula 72.

The sizes of the girders, *a*, *b*, *b*, can be computed as per §206, taking the load on *a* as W at the centre, considering the girder as supported at the ends and of length y; and girder *b* as uniformly loaded with $\frac{1}{2}W$, and fixed at the centre so that length $= \frac{1}{2}z$. The connection between *a* and *b*, *b*, must be such as to carry a shear due to $\frac{1}{2}W$.

Remarks: — The proportions of x, y, z may be varied, so long as y does not exceed $4z$, y need not equal x, although this gives best results, but y should not exceed $6d$.

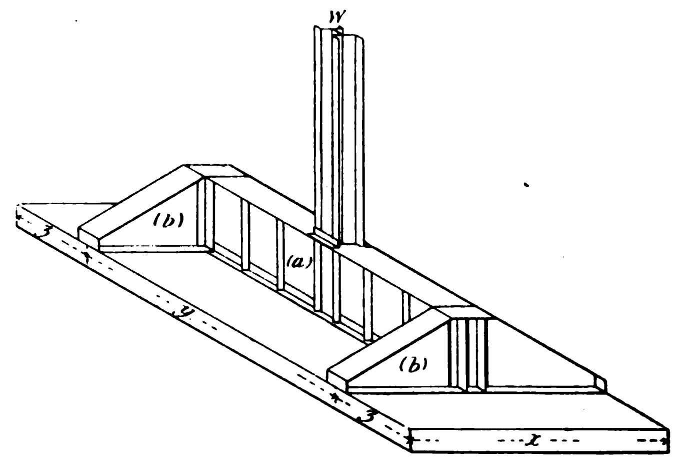

Fig. 89.

This same principle may be applied to the support of two or more columns (Fig. 90).

If the flange area of girders exceeds 72 square inches, or if the other proportions are excessive, then we must increase the depth.

General Remarks: — Every portion of the steel-work should be dipped in a bath of hot asphaltum, or heated and coated with two coats of asphalt, after being thoroughly cleaned with wire brushes and while absolutely dry, or painted with the iron paint described in Chapter XI.

The concrete on which the material rests should be covered with two courses of tarred felt in hot asphalt and worked with a bed of strong mortar 1½″ thick immediately before the girder is set. After the mortar is in place, the concrete should be put on in the very best possible manner, so as to cover every portion of it, and rendered with two coats of hot asphalt.

Immediately before the concrete is applied, every portion of the metal should be examined and any portion that has had the covering knocked off should be dried, and have it renewed. Instead of asphalt the metal paint hereafter described may be used.

All of this work should be rigidly inspected, and workmanship and material brought up to the highest attainable standard. It would also be advisable to employ an engineer to check the computations and supervise the work to guard against mistakes. Use four or more screw-jacks in setting the heavy girders.

§ 268. Metal Spread for Walls: — One method of treatment in metal has already been given under heading "Unsymmetrical Footings," another method for symmetrical footings is as follows (Fig. 91):

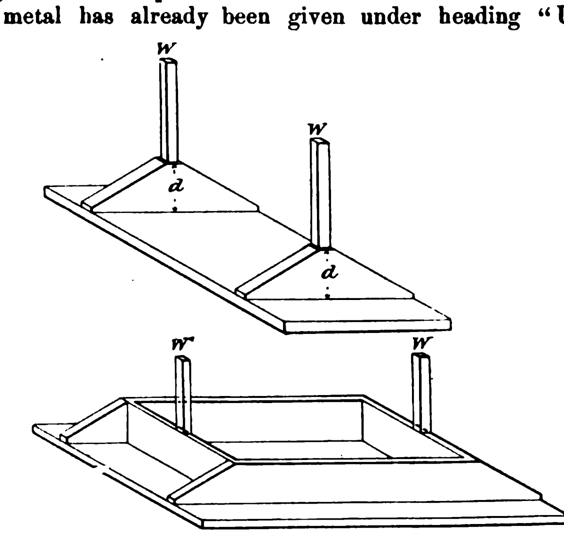

Fig. 90.

Find necessary spread by making

$$(2z + a)\,B = L \qquad (77)$$

a = width of masonry footings.

Space the beams forming z a distance apart, c to c, $=4$ times depth of beam as a maximum: it may be necessary to bring them closer; call this distance in feet c, then R needed for z will be found as in (72) and find size of beam from Table VII.

Remarks: — In execution, spread a bed of concrete 2″ or 3″ in thickness, cover it with two courses of tarred felt in hot asphalt. Then coat the beams with hot asphalt, lay them on a

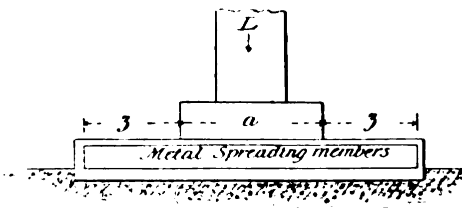

Fig. 91.

$1\frac{1}{2}''$ bed of strong mortar and pack well in between concrete, cover then with cement-and-sand mortar 1″ thick on all sides, then render again with two coats of asphalt, then cover again with 2″ of cement-and-sand mortar, and start the masonry.

In proportioning, make a as large as possible. Usually it will be necessary to make one or two trials before the proper size is found, but that is readily done, especially if the slide-rule is used, since c is the only variable. See that the thickness of the web of the beam is sufficient to resist the crushing strains.

[To be continued.]

THE GREAT EXHIBITION REVIEWED. — I.

AS A SPECTACLE.

To one who has been in almost daily attendance at the Exposition during its formative stages, and later as a disinterested spectator, the earlier period, during which the development of its skeleton has given a lasting impression of its present unreality, might naturally have produced a feeling of disenchantment. But, on the contrary, the enchantment broadens with every passing day, and the thought that all is to pass away forever only tinctures a growing enthusiasm with a feeling of sadness. It is no longer an extravagance to say that, as a spectacle, it has never before been equalled. Memory and history have been searched to find its equal. Other comparable spectacles have only been creatures of the imagination expressed in pictures and romance. Of what the great agglomerations of palaces and sacred buildings of Thebes were we have only a few suggestions in scattered ruins and the fragmentary accounts in the Scriptures. Only one artist, we forget his name, could suggest what they might have been, and we have them in that well-known picture called "The Bearer of Evil Tidings." Another artist, Martin by name, copies of whose pictures are now seldom met with, took for his subject scenes in "*Paradise Lost*," and illustrated them largely by imaginative architecture. In one, the whole amphitheatre of Heaven is shown clothed with architectural forms and peopled by angels on foot and on wing. In another, Satan is shown on a wondrous throne reigning in all his infernal pomp and splendor over the kingdom of darkness, its unearthly and unheavenly structures peopled with the fallen angels.

In all of these the grandeur and sublimity of architecture are suggested, but here we have a spectacle suggestive only of "Peace on earth, good will to men." Our Court of Honor might possibly be compared with the ancient Forum of Rome, with its surrounding structures, of which several ably-drawn restorations have been suggested, or to the great open places of some of the modern European capitals, with their permanent buildings; but the Court is but a small part of the whole scheme, however important it may be from its topographical and official position with reference to the rest of the enclosure. The ground covered is more than a square mile in area, and has a frontage on navigable water of more than a mile. Even this water-frontage has its variations on the land side, from stony beach to carved stone terrace and low, rocky cliffs. It is intersected by two piers jutting out into the Lake, one of which is two thousand two hundred feet long, two hundred and fifty feet wide, and high enough from the water-surface to let the heaviest waves pass harmlessly through it. There are three inlets from the Lake to the inland water-ways, so that steam and electric launches that traverse the basins and lagoons can make a circuit which includes a lake journey through rough water as well as the quiet repose of the Park region.

Even this wave-beaten shore has its ever-changing phases, from the placidity of an inland river to the ravings of an ocean storm; and the rock-bound promontory on which stands the modern reproduction of La Rabida, like its prototype in ancient Spain, drives back the angry waves, while the caravels, as if waiting for the departure of a new Columbus, rest in peaceful security under its sheltering arm in the harbor within. Yet this is not a barren shore: within the line of perfect safety from the waves are marvels of architectural skill, which, seen from the Lake, show every diversity in style, from the rigid Classic of the Peristyle and the modern Renaissance of the Manufactures Building to the Elizabethan Victoria House on its lonely eminence and the quaint mediævalism of the German headquarters. And before them all lies the latest model of naval architecture, the battleship "*Illinois*," under its protecting mole, and the guns of Krupp frown from mimic bastions on the land near its southern extremity. Here Nature and Art lie under the veil of peace, their security assured by the ever-present engines which science has provided for their protection.

The water-front of the Exposition is the only approach from which its full nature and extent can be appreciated. It was always the desire of its landscape-designer, Frederick Law Olmsted, that the greatest number should see it first from the Lake, and then be introduced to its spectacular splendors through a gateway therefrom. The water-gate is here through the centre of the Peristyle, spanned by the first bridge under the "Columbus Arch," and the second one connecting the terraces which surround the Grand Basin, all, with the surrounding buildings, constituting the Court of Honor. Passing out from under this inner bridge, the whole glory of the Court is revealed. Here the Administration Building, the greatest monumental work of Richard M. Hunt, is seen, eleven hundred feet away. Behind it, forming a background at the west end of the Court, is a lower but palatial building by Charles B. Atwood, which is the Terminal Railroad Station, where passengers should land who go from the city by rail — but only a small proportion do so. To the right are the south ends of the Manufactures Building, by George B. Post, the Electricity Building, by Van Brunt & Howe, and the Mines Building, by S. S. Beman, all on one line, and their cornices of uniform height. To the left are the Agricultural Building, by McKim, Mead & White, and the Palace of Mechanic Arts, by Peabody & Stearns, also on one line and of uniform height.

But this effect cannot be seen by the stranger making his first approach, because, if he goes by water, he is landed at the long pier, and he can only be transferred to the smaller steam-launches after walking to the landing-places inside of the basin. The full approach by water through the Columbus Arch may, however, be made by taking a steam-launch in the south pond, behind La Rabida. These launches go first into the Lake, around the great pier, and approach the basin by the route above mentioned.

The Court of Honor is the artistic and geographical, as well as the official, heart of the Exposition. Its fame is now world-wide, but the honor of the Exposition will not rest upon it alone, even regarded as a spectacle. Its designers have crossed it by another court of similar treatment, so that, traversing the Grand Basin, the visitor suddenly emerges upon the vistas of the north and south canals, which branch out from it on either side. The form of the united waters is that of the letter T, while that of the line of buildings that surrounds the whole is a Latin cross, the upper arm of which is the Grand Plaza, in the centre of which stands the Administration Building. The north or right arm is between the Manufactures and Electricity Building, and the left or south arm is between the Agricultural and Machinery Buildings. This arm is closed at the south end by the Colonnade, which is not only a colonnade proper, but consists of a small building at each end and a triumphal arch in the centre (which is the entrance to the out-door agricultural exhibits), these being connected by columns and entablatures of the same design as those of Machinery Building. In front of the arch, on the lower terrace, stands the commemorative monument of the World's Columbian Exposition, of which more hereafter.

The aggregation of buildings surrounding the four arms of the Latin Cross: the Administration Building, the Peristyle at the east, the Grand Plaza, the double terraces surrounding the three basins with their many flights of steps and double rows of balustrades, the three bridges crossing the basins, the eight colossal domestic and draught animals that stand in front of the buildings, the numerous statues of wild beasts on the balustrades of the terraces, the eight rostral columns, the monument at the south end, the electric fountains and McMonnies Fountain, the Columbus statue by St. Gaudens at the west and the great statue of the Republic by French that rises from the water at the east, — together form a one-and-indivisible, harmonious and complete composition, to which every art ever practised by man has contributed; a composition which has never been equalled in extent, proportion and harmonious blending of all its component parts; not a triumph of architecture alone, or even comprised of perfect architectural elements, but as nearly perfect as a whole as human brains, hearts and hands have ever devised; for the men who did this had their hearts in the work as well as their heads and hands. By the touch of genius water and earth have here become the handmaids of architecture — sculpture and painting have been her sisters, and it seems as if nothing but a great Spirit could have brought these souls together to guide them in what they have wrought. The grand Court is a symphony complete in all its parts and from which nothing can be left out. The voice of criticism has not thus far asked that anything be added to or taken from it. To make this scene of enchantment complete, the management has peopled it with boats — not too few nor yet too many of them: they move about with graceful motion like things that belong there; half of them are gondolas from Venice, painted not as they are in modern Venice, but as they were in the fourteenth century, and manned by Venetian gondoliers. That the scene may not be too Venetian and to remind us that we are still in a practical and progressing world, half of the boats are electric-launches gliding silently about with no apparent means of locomotion. There are also a few

steam-launches so that we need not suspect that there is any mystery in the science of locomotion.

Nor is all this the work of one mind but of many master-minds. One master-mind, that of D. H. Burnham, acted as the moderator and balance-wheel for the rest. They all acted in concert, and yet independently. All were the critics of each by mutual consent. The work of each was approved by all the rest, and that is the only underlying secret leading to this grand success. No one man could have done this. No body of men could have done it otherwise.

But as has been said, wonderful as may have been the result here achieved the honor of the Exposition is not due alone to the Grand Court. It is only one of five grand subdivisions each of which has its distinctive characteristics. South of this central attraction lies the space devoted mainly to agriculture, stock and out-door exhibits.

In this district, which can be seen only by itself, architecture does not play a prominent part: it is devoted to the useful and the practical only, as also to the educational features of the Fair.

Next north of the formally arranged Court, but blending into it, is the section devoted to the picturesque in architecture and landscape art. It is the part immediately surrounding the Wooded Island and lagoon. The transition, however, is not through a barrier, but is gradual. The irregular lagoon is the central feature. The great Manufactures Building, too large for any one section to contain it, encroaches on this and one side continues half-way north along the lagoon. In addition to this, the north ends of the Electricity and Mines Buildings face on this district. The Transportation Building by Adler & Sullivan gives the festive character to the scene and is the first to break from the formal arrangement of the central group of buildings. Here styles of architecture change and the utmost variety in design prevails. Transportation Building is all color, Horticulture Building, by Jenney & Mundie, is light, graceful and full of sculptured form. The Woman's Building, by Miss Hayden, follows and is rightly effeminate in its architecture. To the north of the lagoon is the picturesque Fisheries Building, by Henry Ives Cobb, which bounds the northern part of this group.

The last general subdivision to the north comprises the State and Foreign Buildings. Near the centre of these is what is now an arm of the lagoon, but formerly the lake in what was once the improved part of Jackson Park. On the north of this lake is the Fine Arts Palace by Charles B. Atwood. This was the last large building located in the Park, as for a long time it was thought that it would be built on the Lake Front Park. When it was finally sent to Jackson Park it had to take the only large vacant place that was left — and thus spoiled a beautiful open campus about which the State and Foreign Buildings were to have been grouped. Its façade on the lake shows to good advantage, its long annexes being scarcely visible on that side. The architecture of the State buildings is so varied and incongruous and their locations in many cases so badly chosen that little can be expected from the resultant groupings, and it can be truly said that the face of nature has been blemished by their presence. The same is almost true of the foreign buildings, which with the exception of that of Germany are badly placed. But the architecture of Germany, England, Sweden and Norway is admirably characteristic of those countries.

The fifth division of the Exposition is the strip 600 feet wide and one mile long connecting Jackson with Washington Park, and called the Midway Plaisance. This is a name that was given to it by Mr. Olmsted when he designed the South Park System twenty-five years ago. It signified the playground between the parks. It is now the playground of the great exhibition and as such has removed from the immediate vicinity of the artistic, scientific and industrial features, everything of the nature of an amusement. It is, therefore, spectacular to the highest degree. Here is a broad street a mile long completely filled on each side with places of amusement. Many of them comprise considerable areas of ground, but most of them are very shabby affairs. The best are mainly of ethnological interest, and only three have any architectural value. These are the German Village designed by Karl Hoffaker of Berlin, the Street in Cairo by Mr. Haas of Cairo assisted by Henry Ives Cobb of Chicago, and the Java Village by native builders who have provided a very interesting illustration of building with bamboo and rushes.

Leaving the Fair by the western gate of the Midway the reader will be asked to return with us again and examine it more in detail. We have only seen in a cursory way what in many respects is the culminating glory of American architecture; for with the exception of the buildings of foreign governments it is the work of American architects, sculptors and painters, and will go down to history as an American exhibit. Such a spectacle may well strike the beholder with surprise if not with awe. It shows what organization and coöperation will do when directed by an efficient head, and subject to a wise censorship. No wonder then that this architectural spectacle has overwhelmed those features that to the world at large, should be held to be of the greatest importance in an International Exhibition — its progress in art, science and all industrial pursuits. But architecture is itself an exhibit and as here exemplified its exhibition will lead to a better popular appreciation of the importance of grouping no less than of design, the effects of which must be seen throughout our land in the near future. It alone will take this down to history as *the* Great Exposition. The first of an international character, at London in 1851 was called the "Great Exhibition." It has been eclipsed by greater ones, and even the last is only known as *the* Paris Exposition to distinguish it from all others previously held in Paris. But the old title of the first will be revived and this should hereafter be known as the Great Exposition.

P. B. Wight.

[To be continued.]

WATER-POWER.[1]

Where there exists a natural waterfall, with a considerable and regular flow, and where local conditions are favorable for the construction of the necessary works, water-power is generally cheaper than steam-power. The water costs little or nothing; the cost of maintenance of hydraulic machinery, and the cost of superintendence are small; the power is regular, controllable and convenient. In such cases, the annual cost of the power consists almost entirely of interest charges on the capital expended in works and machinery.

With some exceptions, water-power is at present utilized in the neighborhood of a natural waterfall. The usual means of transferring the power of the fall adopted, till a recent period, has been the conveyance of the water itself in canals and pipes. In some cases water has been thus conveyed for hydraulic mining, and manufacturing purposes very considerable distances. But a more convenient and cheaper means of transmission would greatly increase the availability of water-power, and the relative importance of steam-power and water-power would, in some countries, be very considerably changed.

It appears, from a report by Mr. Weissenbach, that in 1876, 70,000 horse-power derived from waterfalls were applied in manufacturing in Switzerland. Probably the amount now employed is at least 80,000 horse-power. It is estimated that the total available water-power in Switzerland amounts to 582,000 horse-power. Putting the annual value of a horse-power at £6, this represents an annual value of £3,500,000. Used to replace steam-power, it would save annually 1,250,000 tons of coal. It is stated that at the present time Switzerland pays £800,000 annually to other countries for coal.[2] Nearly the whole of this expenditure could be saved if its natural wealth of water-power were utilized. The recognition of the importance of this supply of power is exciting great interest in Switzerland, and there is hardly an important factory which is not either using water-power or making preparations or surveys with a view of doing so.

The utilization of water-power often involves the construction of large permanent works, such as river dams, reservoirs and canals. Mr. Emery estimates that at Lawrence, in the United States, £200,000 were spent on works, independent of the hydraulic machinery; and, at Lowell, a still larger sum.[3]

Such extensive works can best be executed by an association in the interest of many consumers. Thus is created a water-power company, who establish what is virtually a central water-power station and a distribution of power at a rental to consumers. In the American cases, as already stated, the water itself is distributed in canals to consumers at a level permitting the creation of a waterfall at the mill or factory. But in certain other cases a further step was taken; the water-power company utilized a natural fall and erected the necessary turbines, and then transmitted the power in the form of mechanical energy to consumers. Installations of such a kind, now of a quite respectable antiquity, were erected at Schaffhausen, Freiberg, Zurich and Bellegarde. In these cases the means of transmitting power adopted, admirable as it was, had limitations and the extension of the works was restricted. Now that there are new means of transmission, the Schaffhausen and Zurich power-generating stations are being increased, and a new and remarkable installation has been erected at Geneva.

The original project for utilizing the motive-power of the Rhone at Geneva, partly for pumping a supply of water, partly for motive-power for industry, comprised 20 turbines of 300 horse-power each, or an aggregate of 6,000 horse-power. Fourteen of these were at work in 1892. Four more of somewhat larger size will, it is expected, be constructed by 1898. When these are at work, the whole available water-power in Geneva will be utilized. But it is foreseen that the demand for power will not then have been satisfied. The total receipts for the installation reached £22,500 in 1891, and were increasing £2,200 annually. The Municipality of Geneva has determined to provide for future demands, and plans are being studied for utilizing 12,000 horse-power at a point on the Rhone six kilometres below Geneva, whence the power will be distributed electrically. At Biberest, near Soleure, Messrs. Cuenod, Sautter & Company have utilized 360 horse-power, and transmitted it 28 kilometres electrically. At Genoa water-power due to surplus fall along a line of water main has been utilized at three stations. The greater part of the energy is transmitted to Genoa for electric lighting and power purposes.

These are cases where water-power has been utilized and distributed, which are actually in operation; but there are many other schemes projected: one is for utilizing 10,000 horse-power on the Drause, near Martigny; another to utilize 20,000 horse-power at a point 17 kilometres above Lyons. In Sweden, there is a project to transmit power from the Dal River Fall, at Mansbo, to the Norberg mining district, a distance of 10 miles; another to transmit the power

[1] Extracts from a lecture by Prof. W. Cawthorne Unwin, F. R. S., delivered before the Society of Arts and published in the *Journal* of the Society.
[2] Reifer: "*Berechnung der Turbinen.*"
[3] "*Cost of Steam-power.*" By C. E. Emery. "Trans. Am. Soc. of Electrical Engineers," vol. x, p. 123.

of the Strup Waterfall, on the Judal River, to the town of Ostersund, a distance of 11 miles. Projects for utilizing the Falls of Trollhatan, and the River Motala to supply power to Gothenburg and Nord Koeping, have also been studied.

Water-power in the United States of America. — It is in the United States of America that water-power is most largely used, where it is in most direct competition with steam-power, and where data for a comparison of their relative advantages can best be obtained. Interesting data as to the extent to which water-power is utilized in the United States are given in a paper by Mr. G. F. Swain, read before the American Statistical Association.[1]

The money value of the water-power utilized in the United States is very considerable. From the returns of the Tenth Census it appears that in 1880 there were 55,000 water-wheels and turbines of an aggregate of 1,250,000 horse-power. At £5 per horse-power per annum the water-power utilized is worth £6,250,000 a year.

The comparison of the relative amount of water and steam-power is interesting. Taking the whole of the United States, 36 per cent of the power used in manufacturing was at that date water-power, and 64 per cent steam-power. In certain industries the proportion of water-power was greater. In the manufacture of cotton and woollen goods, of paper and of flour, 760,000 horse-power derived from water, and 515,000 horse-power derived from steam, were employed. In the North Atlantic division 4.81 water horse-power are utilized per square mile.

Division.	Water-power per cent.	Steam-power per cent.
N. Atlantic	43.1	56.9
S. Atlantic	49.5	50.5
N. Central	22.2	77.8
S. Central	22.5	77.5
Western	35.3	64.7
The United States	35.9	64.1

With Mr. Swain's paper was published a map, which shows that over a considerable area of the United States the water-power used exceeds the steam-power. It should, however, be pointed out that in the decade 1870–80, during which the total power used increased 45 per cent, 9 per cent of the increase was due to water-power and 91 per cent to steam-power. It is possible that under the new conditions now obtaining the present decade will show a greater relative increase of water-power.

American Method of Distributing Water-power. — The method in which water-power is distributed in America to a number of consumers is almost peculiar to that country. A water-power company is formed, which undertakes the construction of the permanent works, such as a river dam, sluices and distributing-canals. In New England there are five water-power stations, where more than 10,000 horse-power is utilized during working hours, and thirteen stations where more than 2,000 horse-power is utilized. The water is distributed to mill owners, who construct the turbines and pay a rental to the water-power company proportional to the amount of water used. The earliest application of this system was at Paterson, New Jersey where the Passaic river furnishes about 1,100 horse-power night and day.[2] At Lowell, Massachusetts, the utilization of the water-power began in 1822. The Merrimac River has a fall of 35 feet, and furnishes, at the maximum, about 10,000 horse-power during the usual working hours. At Cohoes, in the State of New York, the Mohawk River has a fall of 105. It could furnish about 14,000 horse-power during working hours, but is only partly utilized at present. At Manchester, New Hampshire, the Merrimac has a fall of 52 feet, and furnishes, at the minimum, about 10,000 horse-power during working hours. At Lawrence, Massachusetts, the Essex Company built a dam forming a fall of 28 feet, and obtaining a minimum power of 10,000 horse-power during working hours. At Holyoke, the Hadley Falls Company built a dam forming a fall of 60 feet, rendering a power of 17,000 horse-power available during working hours.

To indicate the magnitude of some of these works, it may be stated that at Lawrence the masonry river-dam is 900 feet long and 32 feet in height. The cost was £50,000. From this dam two canals extend down stream, one on each bank, and between these canals and the river are located the mills, occupying the entire river-front. On the north side the mills extend for a distance of more than a mile. The cost of the canal on the north side, 5,330 feet in length and 100 feet in width at the upper end, was £50,000. The canal on the south side, 2,000 feet in length and 60 feet in width, cost £30,000.

The case of Holyoke may be described in somewhat greater detail. The whole of the factories in the town are worked by water-power, and the system is simply a distribution of power to many consumers at a rental strictly proportional to the amount of power used, although the power is actually developed in the mills by turbines belonging to the mill-owners. The first wier or dam was built in 1847, but it was carried away. A second dam of cribwork was built in 1849. In 1868 an apron was constructed to protect the rock immediately below the dam; since then, Mr. Clemens Herschel[3] has carried out extensive repairs of the dam under conditions of singular difficulty and with great success. The structure is now 130 feet in width, 30 feet high and 1,019 feet in length. From above the weir a first canal supplies water to the highest line of mills. From these mills, after driving turbines, the water is discharged into a second canal, which is a supply-canal to a second line of mills. The tail races of these mills discharge into a third canal feeding a third line of mills, and there are still other mills worked by the water before it returns into the river. The power now utilized is 15,000 horse-power by day, and 8,000 horse-power at night. Altogether there are about fifty-three mills.

With the grant of land for a mill there was leased the right to use a definite portion of the water. A "mill-power" is defined as thirty-eight cubic feet of water per second on a fall of twenty feet during sixteen hours per day. This gives about sixty-three effective horse-power on the turbine shaft. At the time when Mr. Herschel became engineer to the water-company the water was used extravagantly. By introducing a system of testing the turbines, and by establishing gauges at each mill showing at any moment the amount of water passing through the turbines, great economy in the use of the water was secured. The water saved was sold for surplus-power. Observations of the amount of water used by each turbine, and the difference of level in the head and tail race are made once in the day and once at night. Three inspectors are engaged exclusively in this work. From the daily observations the amount of power used by each mill is calculated. A portion of the power is charged for according to the terms of the lease, at a fixed rental. The balance is charged for as surplus-power. In times of very low water, the power is restricted to the amount guaranteed in the lease.

Relative Cost of Water and Steam-power in the United States. — In some cases local conditions are so favorable that water-power can be developed at an almost nominal cost. In other cases unforeseen contingencies have led to expenditures, which have made the cost of water-power excessive; greater, in fact, than that of steam-power. Mr. Swain puts the average cost of steam-power in the States, in favorable localities, at £4 per horse-power per annum, and that of water-power at about £2 per horse-power per annum. Both these estimates are so low that it may be suspected that they are based rather on the nominal power of the plants than on the average actual horse-power used throughout the year. The cost of water-power, however, varies greatly. Mr. Swain states that while in the northwest of the United States the cost for interest, depreciation and water-rental is about £2.2 to £2.5 per horse-power per annum, in New Jersey it is from £12 to £15. That water-power is used at all at a cost so large as this proves that it has advantages of convenience compared with steam-power, which balance some excess of cost.

It is somewhat difficult to arrive at a precise knowledge of the cost of water-power in the great works in America, because of the gradual way in which they have been developed, and the want of complete data as to the amount expended. Mr. C. E. Emery,[4] who is probably rather prepossessed in favor of steam-power, has made the following estimate of the cost of water-power at Lawrence. He puts the total cost of the structural works at Lawrence at £200,000, and the power utilized as equivalent to 13,000 horse-power for ten hours daily throughout the year. That makes the cost of structural works £15.4 per horse-power. The cost incurred by the mill-owners in erecting turbines, sluices, etc., he puts at £9 per horse-power of turbines, or £13 per average horse-power, actually utilized, the turbines being generally constructed to yield the surplus power in times of emergency. This makes the total expenditure £28.4 per average horse-power, utilized ten hours daily throughout the year. He allows 2½ per cent for depreciation, 1¼ per cent for repairs, 1¼ per cent for taxes, 10 per cent for interest and 2 per cent for working expenses, or, altogether, 17 per cent on the capital expenditure. This makes the annual cost of a horse-power at Lawrence £4.7 per annum, which he takes to be about the same cost as that of steam-power with economical engines and coal at 8*s.* to 12*s.* a ton. No doubt, however, in many cases, water-power can be utilized at a less cost per horse-power than that incurred at Lawrence.

Cost of Water-power at Geneva. — It appears that at Geneva, for the first groups of turbines erected, of 840 horse-power, and for the river works then completed, the capital cost amounted to £60 per effective horse-power. The groups of turbines subsequently erected have cost only £19 per horse-power. The mean cost, when the present works are completed, will amount to £27 per effective horse-power. In this case the water costs nothing. If we allow 5 per cent for depreciation, repairs and working expenses, and 10 per cent for interest on capital, the cost per horse-power per annum will only amount to £4. In the new works below Geneva, where 12,000 horse-power are to be utilized, it is estimated that the whole cost for turbines and structural works will amount to £60 per horse-power for the first 2,400 horse-power. When the installation is completed, the capital cost will be only £27 per horse-power. — *Journal of the Society of Arts.*

[1] "Statistics of Water-power Employed in Manufacturing in the United States." By G. F. Swain. Publications of the American Statistical Association, March, 1888.

[2] J. B. Francis: "Trans. Am. Soc. of C. E.," vol. x, p. 189.

[3] "On the work done for the Preservation of the Holyoke Dam, in 1885." By Clemens Herschel. "Trans. Am. Soc. Civil Engineers," vol. xv, p. 543.

[4] "The Cost of Steam-power," By C. E. Emery. "Trans. Am. Soc. of Electrical Engineers," March, 1893.

WHAT IS TO BECOME OF THE FAIR BUILDINGS. — THE STATE BUILDINGS. — PROPOSED FORMATION OF A MUSEUM OF RELICS OF THE FAIR.

NOW that the last month of the Fair draws near, about as much interest is displayed as to how the buildings will be disposed of on the grounds as there was over their erection more than two years ago. To say that the Directors have a white elephant on their hands repeats a hackneyed joke which but feebly expresses the actual state of affairs. In round numbers, nineteen millions of dollars represent the sum which was expended on the World's Fair buildings and grounds. The chief point of interest now not only to the stockholders, but as a matter of curiosity to the whole country, is how much of this nineteen millions can be realized from the material now on hand. The labor, which was a large item, of course, goes for naught, and at present it looks as if much of the material will realize but little. It has been a generally-accepted opinion that the ironwork used in the great buildings could be utilized in others, but it now seems that much of this ironwork, as any sane person would know, was especially planned for its especial place, and that it will in all probability not be feasible to use it anywhere else. The putting in place of these huge trusses and beams was, of course, a tremendous undertaking, and to take them down will cost nearly as much. Various contractors and iron-men are reported as giving very discouraging views concerning the practicability of using the metal-work. The good pine lumber in the floors and galleries of the buildings would be of some worth, but the disposal of the staff covering of the structures is, of all the material used, the most discouraging problem.

There is much talk about keeping the Fair buildings, and not destroying them at all, but this is simply nonsense, for already they have lost the sparkling beauty which so charmed the visitor through May and June. Large pieces of staff are continually falling from the walls, and here and there holes are appearing in some seemingly massive column or balustrade. The idea of keeping the buildings for beauty's or utility's sake could not be entertained by the Directory for a moment. That this fine creation should be allowed to grow shabby and grimy and shoddy-looking before our eyes would be a much greater hardship than to have it fade from sight all too soon.

In the meantime, the press and private individuals, through the press, are not backward in giving all sorts of valuable suggestions concerning this part of the enterprise.

The Director of Works is reported as advocating the scheme of having the buildings fired, burning in this way the staff and timber, and leaving the iron for future use. The papers suggest that if the buildings were burned on different evenings, large prices would be paid for admission-tickets to so grand a sight. There seems to be numerous drawbacks to this plan. One is that the material best worth saving would be entirely destroyed, and the iron would be so affected by the heat as to become quite useless.

Another idea is to let the buildings remain, and plant vines and ivy around them, trusting to the elements in time to transform them into picturesque ruins, thus supplying a long-felt want in the country.

Next to this plan stands one to demolish the buildings and by dumping the refuse into the lake form in this way what has been always much desired here, islands in our harbor.

The Directors of the Fair have given bonds to the amount of one hundred thousand dollars to remove the buildings before a certain date and it has now been suggested that the easiest way out of the difficulty for the Directory would be to forfeit the bonds and let the Park Commissioners solve the difficulty themselves. These gentlemen are consequently coming in for their share of the anxiety as to what could be done should all these buildings be left upon their hands.

Concerning the disposal of the State and Foreign buildings this controversy is being carried-on on a somewhat smaller scale. Some of the structures are reported as having been given to certain societies, some are being quite thoroughly advertised as for sale, others as having numerous bids made for them, some as already sold, while a few, a very few, are not in the market, but will be returned to the section of the country from whence they came. Many of the buildings are quite unworthy being preserved anywhere, and their remains would be fit subjects to rest in the unknown grave, wherever it may prove to be, of the great and departed glory of the Fair. Many of the buildings are simply atrocious, and when in the midst of the worst of the collection, you begin to be convinced that from an artistic standpoint at least, it was not a wise thing to have allowed the States to represent themselves by such architectural abominations. The Illinois State Building has been severely enough criticised to have gained an unenviable reputation, but there certainly are others, smaller and less conspicuous, which equal, if not excel it in bad style and poor taste. It has become the fashion to criticise and scorn the Illinois Building and certainly it is not an artistic creation, but it is often the most severely condemned by people who understand any architectural feature so little that had they been told that the proper thing was to admire it they would have been loudest in its praise. It simply represents that adaptation of what was supposed to be the Classic style of architecture which was so popular for out-of-the-way State capitols and small country court-houses, not many years ago. The building might have been worse, we see, when we compare it with certain smaller buildings, and also when we look at better ones, we see a still sadder "might have been." Nothing could be more atrocious than the interior decoration of the central dome, but some really charming work has been done by the Illinois women in the parlor and little library. The decorative panels on the wall of the parlor, done by different artists on canvas in oils, and treated in a not too rigid conventionality of style are delightful, strong in drawing and most harmonious in coloring. They surpass in excellence work of a similar nature done in the Pennsylvania Building, which is not in itself poor. The decoration in the small library, opening out of the Illinois parlor is the work of one young woman and is quite different in treatment from that of the larger rooms. Like the other work it is oil on canvas, but consists of strictly conventionalized designs in rich warm colors, one of the chief features of the decoration and a very charming and appropriate one being the introduction of old book-plates. The Illinois Building, at least on the interior, is quite typical of our State: side by side with high artistic feeling and culture is to be seen the evidence of the most illiterate and inartistic existence. One of the best American educational exhibits is found in this building, in the department of architecture, engineering, physics and natural history, and not many steps removed from it is some abomination of a false stone grotto, or some libel, in the shape of a cereal picture of the waving cornfields and rolling prairies.

Kansas when we are looking for something most to be avoided stands out in good shape — a heterogenous mass of "architecture."

The Arkansas State Building, this time the work of a woman, is a curious confection of staff, painted white. The exterior ornamentation in lack of any style is only equalled by the decoration of the interior.

But in the midst of the large number of State buildings one has hardly time to waste among the poor ones when there are really some such delightful specimens to claim one's attention. Idaho's Building is not excelled by that of any State structure in the artistic application of the characteristics and features of the State in the construction of its building. The structure is a combination of the Swiss and Norwegian peasant style, and the log cabin of America, with certain local modifications introduced. The material of the building is volcanic rock combined with pine logs from which the bark has been removed. The general outlines of the building are very satisfactory, and the way in which the exterior is studied out in relation to the interior bespeaks an amount of careful thought only equalled by the care for the details of the interior. Thus there are open fireplaces and mantels, all of rough timber and tufa, which are really charming. The rough but artistic mantel on the stair landing of unpolished plank has a general symmetry of outline and proportion, which lifts it very far above the commonplace. No inappropriate feature even in small details is introduced. The doors are, many of them, of one heavy plank of cedar not sawed but split, and the hardware on them consists of long spear-heads for hinges and a bowie-knife for the handle. The use of the knife in this place is especially ingenious. The handle of the weapon itself serves on one side for the handle of the door, while the blade, passing through the plank, has its point bent down in a curve forming an almost conventional-shaped latch-handle. At one of the fireplaces bear-traps are so arranged as to serve for andirons, and even the furniture itself though of pleasing and comfortable shape is made out of crude material. Part of the State exhibit hangs on the walls in the shape of skins, beautiful stags' heads, etc., carrying out in part the details of the excellent whole. Report has it that this building has already been purchased by an Englishman. Certainly nothing could be more suitable for a hunting-box than this structure, and it is to be hoped this will be its fitting use. More applications have been made to learn the price and ultimate destination of this building than of any on the grounds.

Farthest removed from this building in character though not in location in the grounds is that from New Jersey. This is an unostentatious wooden structure whose good taste in the exterior is more than equalled by that of the interior. The entrance-hall is in the form of a good-sized square room, which is two stories in height, a circular gallery enclosing it on the second story from which open the sleeping-rooms. The effect is very pleasing, but the practical advisability of such a plan, although modelled after an actual colonial house, might be for every-day use very questionable.

Equally different in character and one might also add equally charming, though bearing not the slightest impress of any local characteristic, is the Vermont structure. This is a perfect little Pompeian house, built of staff. Up the short flight of steps you enter the closed court in which a fountain splashes. On either side is a recessed portico while at the back under a lintel supported by caryatides you pass into the general assembly-room of the building, in which prevails a good deal of the feeling of Pompeian architecture, half Greek, half Roman, with the pure and brilliant colors of the decoration.

Massachusetts House has been so often described that words concerning that become trite. It is as charming as all reports have given it credit for, and, in its flower-bordered terrace, stands a unique feature among the State buildings.

Next to it, New York, in the style of the Italian Renaissance, lets no chance escape to appeal for notice in loud though indeed not inelegant accents to every passerby. The exterior of the building is excellent in its strict adherence to the style which has been chosen for it, while the interior is equally faithful to its principles; but there is a certain bombastic grandeur about the whole which is amusing to the unprejudiced eye. Rumor has it that this building has been given to the permanent organization for women which, after the close of the Fair, is to have headquarters in Chicago. What the women can ever do with such in many respects beautiful but altogether unpractical quarters for a permanent abode it will be interesting to note. The banqueting-hall is carried out in the most extreme manner of a style far from simple, and is interesting simply as a specimen of this kind of work.

Next to the New York Building stands that of Pennsylvania, a copy to a very limited extent of old Independence Hall. The exterior, of buff brick, is entirely satisfactory for such a building, but the interior attractiveness is much lessened by the awkward shape of the rooms, necessitated by the plan.

Florida is represented by a copy of the old Fort at St. Augustine. Externally, it promises to offer features of interest, but these features are not numerous enough to hold one's attention long, especially as no aid is given by the interior, which contains nothing but a bazaar of Florida curiosities.

California's building has as well known a reputation as that of Massachusetts, and, in a combination of the old Spanish mission features, forms a most pleasing building so far as the exterior is concerned.

Near this, Indiana has a very good building in a French fifteenth-century Gothic structure, very well carried out as to its style both inside and out, and well suited for such a club-house as it was intended to be. Several of the fireplaces and mantels in the house are exceptionally successful; one furnished with blue tiles, decorated in gilt *fleurs-de-lis*, is especially attractive.

Most of the foreign buildings have been spoken of in these letters, and late as it now is for first impressions, and well known as most parts of the Fair have become, Sweden's most attractive structure ought not to be passed by unnoticed. The building in itself is rather a combination of the old Swedish ecclesiastical and domestic architecture, and is much of it made of material that constitutes the building exhibit. It is very successful, in spite of this rather unusual variety in its parts. In the plan, a hexagon is inscribed between the sides of the triangle of the floor-plan, and the boundary of the figure decides the shape of the main hall of the building. The corner spaces of the structure form each a separate room of considerable size, and galleries run around the building. The hexangular main hall is about sixty feet square, and surmounted by a towering cupola. The entire Swedish exhibit is housed in this building: an interesting display of Swedish furniture in characteristic interiors here appears.

Spain's building, not far distant from Sweden's, is not devoid of interest, though there is but little attempt at a display of any kind inside. It is a three-fourths reproduction of a section of the Silk Exchange at Valencia, Spain, whose erection was commenced in the very year Columbus sailed on his great voyage of discovery. The part shown here represents the column-hall and the tower where all defaulting and bankrupt merchants were confined. A circular stairway, approached from an inside entrance, is the means of reaching the top of the tower. A very interesting collection of photographs is here displayed of old Spanish pictures, as well as some few architectural drawings.

At the last meeting of the Illinois Chapter of the American Institute of Architects, the advisability of founding a permanent architectural museum here in the city was discussed. A committee was finally appointed to look into the matter and report at the next meeting. It seems as if there would be much of architectural interest in many of the exhibits that at the close of the Fair would either be willingly given to such an institution, or would be obtainable at a trifling cost. Such collection would not include the architectural casts from the Trocadéro, which are to go to the Art Institute. It is hoped that some one of the foreign buildings could be obtainable for at least the temporary home of such a museum, and a nucleus could thus be formed for a collection which, though small, would be of interest to the profession.

SOCIETIES

ENGINEERING ASSOCIATION OF THE SOUTH.

AT the meeting in Nashville, Tenn., September 14, Mr. W. G. Williamson discussed the relations of the City Council, the Board of Public Works and the City Engineer. He concluded that in small cities the existence of both the Council and the Board causes needless complications, though in large cities the great amount of public work makes the Board more efficient than a committee from the Council; that the engineer should be appointed by the Board, but should not be embarrassed by their appointing any of his assistants; that orders to the engineer should come from but one authority, and, if these orders are contrary to the engineer's judgment, he should be allowed to put his objections on record; and that it is not good economy to bind an engineer to let work to the lowest bidder.

The paper of Mr. Walter G. Kirkpatrick described "A Triangulation System for River Surveying." The field-work consists of reading four angles at each of a series of stations along one bank of the river, the distance between the first two stations and that between the last two being measured with a tape. The computation is simple, a connected series of sine proportions, so that the addition of logarithms is cumulative, each addition evolving the length of a line in the system. The platting is by chords, affording a good check against errors. The system, though accurate, requires but little more work than the ordinary transit and stadia survey; the computation can be framed from the field-notes; then all the logarithms taken from a table, then all the additions made, evolving all the necessary distances, with which the platting proceeds in a connected chain.

Mr. J. S. Walker discussed the roof-trusses of the World's Fair buildings. Mr. Hunter McDonald outlined the methods and progress in sinking caissons, forty feet, for the foundations of the Johnsonville Bridge, now being constructed across the Tennessee River for the Nashville, Chattanooga & St. Louis Railway.

The Association will meet next on October 12.

WALTER G. KIRKPATRICK, *Secretary.*

ST. LOUIS CHAPTER OF THE AMERICAN INSTITUTE OF ARCHITECTS.

THE third annual meeting of the St. Louis Chapter of the American Institute of Architects, was held on the evening of September 26.

The following géntlemen were elected to serve the ensuing year: *President*, Thomas B. Annan; *Vice-President*, William B. Ittner; *Treasurer*, Charles K. Ramsey; *Secretary*, Alfred F. Rosenheim.

The Chapter numbers now 30 members, divided as follows:

Regular..........	17
Associate.........	9
Honorary.........	4

A. F. ROSENHEIM, *Secretary.*

THE ILLUSTRATIONS

[*Contributors of drawings are requested to send also plans and a full and adequate description of the buildings, including a statement of cost.*]

THE EDISON BUILDING, 42 BROAD ST., NEW YORK, N. Y. MESSRS. CARRÈRE & HASTINGS, ARCHITECTS, NEW YORK, N. Y.

[Gelatine Print issued with the International and Imperial Editions only.]

HANCOCK CONGREGATIONAL CHURCH, LEXINGTON, MASS. MESSRS. LEWIS & PAINE, ARCHITECTS, BOSTON, MASS.

THE building sits directly opposite the historic spot where the first shot was fired in the American Revolution. The dimensions are 65′ 0″ × 130′ 0″. The walls are of field stones with undressed granite trimmings. The interior, below the plates, is finished in quartered-oak, the hard-pine roof trusses being exposed, and the ceiling finished with narrow strips of beaded cypress. The building is thoroughly heated and ventilated by the Sturtevant-blower system. The entire cost, including heating, ventilating, pews, decorating, fixtures, etc., but not including the memorial windows, was about $32,000.

COMPARATIVE PLANS OF FIVE INTERNATIONAL EXHIBITIONS.

FROM *Engineering News* for January 30, 1892, we adapt the accompanying plans of the last five international exhibitions, drawn to the same scale, and condense some of the statistics.

The Vienna Exhibition in 1873 was held in the Prater, a park of some 4,000 acres, the four main buildings covering an aggregate area of 34.88 acres. The main building or Industrial Palace was 2,953 feet long by 83.6 wide crossed by sixteen transepts 572 feet long by 51 feet wide, while the rotunda at the centre had a diameter of 354 feet. The financial failures of this exhibition was largely due to the prevalence of cholera in Vienna during the summer.

The Centennial Exhibition, held in Fairmont Park, Philadelphia, in 1876, was contained in exhibition buildings having an aggregate area of 57.53 acres, increased to a total of 71.47 by smaller structures.

The Paris Exhibition of 1878 was held in the Champ de Mars, the main building covering an area of 46 acres, increased by other buildings to 60.

The Paris Exhibition of 1889 was held on the same site with additional buildings along the quais and in the Esplanade des

Invalides, aggregates an area under roof of 75.50 acres. The Machinery Gallery measured 1,378 feet long by 475.5 feet wide.

		Open, Days.	Total Visitors.	Highest in One Day.	Expenditures.
1873.	Vienna........	186	7,254,687		
1876.	Philadelphia ..	159	10,000,000	274,919	
1878.	Paris..........	194	16,159,719	200,613	
1889.	"	164	32,354,111	387,877	$5,886,395
1893.	Chicago.......	145[1]	14,658,808[2]		

[1] To October 1.
[2] Paid admissions to October 1.

THE MARY S. F. SEARLES SCIENCE BUILDING, BRUNSWICK, ME. MR. HENRY VAUGHAN, ARCHITECT, BOSTON, MASS.

THE Searles Scientific Laboratory for Bowdoin College is the gift of Edward F. Searles, Esquire. The exterior walls are of light-red pressed brick with trimmings of cream-buff Amherst sandstone. All interior walls are of brick without plaster, and all the staircases are of iron. The building consists of three separate departments for the study of chemistry, physics and biology, each having a separate entrance, staircase, etc. The Chemical and Physical Departments occupy the first and second floors and the Biological Department has the whole of the third floor, each having store-rooms, etc., in the basement. The length of the building 172 feet and the depth from front to rear of the two wings is 107 feet. Each department has a general laboratory 60″ x 31″, a lecture-hall 60″ x 31″, a small laboratory 35″ x 32″, a professor's private laboratory and office, apparatus rooms, research rooms, etc. It is expected that the building will be completed in July, 1894. Woodbury & Leighton are the contractors.

HOUSE AT TARRYTOWN, N. Y. MR. MANLY N. CUTTER, ARCHITECT, NEW YORK, N. Y.

THIS house is true colonial in type and very well suited for a suburban residence. To be finished throughout in white-wood. Exterior clapboarded and shingled roofs. The veranda extending nearly around three sides will give plenty of shade in summer. Every room has a large closet and good light.

CENTRAL PAVILION OF THE FISHERIES BUILDING, JACKSON PARK, CHICAGO, ILL. MR. HENRY IVES COBB, ARCHITECT, CHICAGO, ILL.

[Additional Illustrations in the International Edition.]

CHORAL BUILDING, JACKSON PARK, CHICAGO, ILL. MR. FRANCIS M. WHITEHOUSE, ARCHITECT, CHICAGO, ILL.

[Gelatine Print.]

SOUTHWEST CORNER OF THE LIBERAL ARTS BUILDING AND THE AGRICULTURE BUILDING, JACKSON PARK, CHICAGO, ILL. MR. GEORGE B. POST AND MESSRS. MCKIM, MEAD & WHITE, ARCHITECTS, NEW YORK, N. Y.

[Gelatine Print.]

CHURCH OF ST. SIMON AND ST. JUDE, HIGH PARK, SOUTHPORT, ENG. MESSRS. JOHN SUTTON AND HUON A. MATEAR, F. R. I. B. A., ARCHITECTS.

THIS church will shortly be opened. The walls are of Burnley bricks, with Bath stone dressings. The original drawing was hung in the Liverpool Autumn Exhibition.

HOUSE AT LISMOYNE, NEAR BELFAST, IRELAND.

THIS plate is a reproduction of a drawing by Mr. Frank L. Pearson, which appeared this year in the Royal Academy Exhibition.

A SMALL COUNTRY HOUSE. MR. GEORGE KENYON, ARCHITECT.

THIS house was designed for a picturesque and well-wooded site near Holmfirth, a small town in the West Riding of Yorkshire. It was intended to be built of local sandstone, of which there are very good quarries in the neighborhood. The half-timber work was to be of oak, and the roof covered with tiles. The cost was estimated at 1,800*l*. In the arrangement of the plans an attempt was made to obtain simplicity and workability without monotony. The original drawing was exhibited this year at the Royal Academy.

ARCADING IN THE LADY CHAPEL, LICHFIELD CATHEDRAL, ENG.

THE subject of the illustration is one of the finest examples of ogee canopied arcading in the country. The spandrels, being decorated with grotesque animal and floral forms, are extremely quaint. The upper portion of the buttresses have been restored and the Renaissance feeling exhibited in the neckings to finials points to the period when the lines of Gothic architecture were not followed in a spirit of eneration. The original drawing is by Mr. W. F. Edwards.

NOTES AND CLIPPINGS.

A STORY ABOUT CARPEAUX. — Every one knows the celebrated group which made Carpeaux famous, and which now adorns the Garden of the Tuileries — the "Mort d'Ugolin" — the man dying slowly of hunger, surrounded by his starving children. This group was to have been done in Rome, but unfortunately the official programme allowed only three figures at the utmost — *un groupe de trois figures* — said the by-laws. Young Carpeaux clung to his subject and Ugolin had four sons. High words and the ultimate flight of the artist from Rome were the quick consequences. The story came to the ears of the Empress, the Director in Rome fulminated, Carpeaux stood his ground, and finally, by imperial permission and, I believe, imperial generosity also, the sculptor was allowed, not to come to the Concours — the holiness of rules and regulations could never tolerate such madcap revolt — but he was at least privileged to execute at his own expense that wonderful drama of human agony, only to be equaled at the end of his career by that living poem in stone "La Danse." This, too, was nearly discarded for the same reason, the programme only allowing for a three-figure group, as shown in the other nonsensical manifestations that occupy the companion pedestals in front of the Opera House. These seem left there as an unanswerable reason for the transfer of the Carpeaux group to a safer niche in the Louvre, where it will certainly go some day when the art lambs lie down together in peace. If Carpeaux had been less willful and the Empress less kind or less powerful, the upshot of the famous incident would have been the nipping in the bud of a mighty flight of masterly genius, or, in any case, the burial for an indefinite period of one of the heroes of modern sculpture. — *N. Y. Times.*

THE EXCAVATIONS AT DELPHI. — The director of the French School at Athens, M. Homolle, is very much annoyed at the charges made in English papers in reference to the archæological work of the school at Delphi. The work, he says, has not been interrupted by order of the Greek Government, but has been suspended by the school. M. Homolle adds: "We have not violated the agreement nor the regulations, but we have been victims on the part of Greek agents of abuse of power, contrary even to the Ministerial instructions, as has been recognized by the Minister of the Interior, M. Ralli, with the utmost courtesy and the fullest justice, and which has led to the recall of the inspector. We have not concealed from the Greek authorities the discoveries, but every evening we have drawn up a double inventory witnessed by the Greek inspector and a member of the French mission. We have not shut up the antiquities in a mysterious storehouse, but we have set aside certain fragments, always duly noted, which it was necessary to have at hand in order to reconstruct the pieces as a whole. We have not concealed from foreigners either the statues or the inscriptions, and I appeal particularly to the English whom we have been glad to receive as guests. We have never had to interdict any foreigners copying the monuments, for the simple reason that none of them has ever had any intention of contesting our rights of first publication." — *New York Evening Post.*

THE INFLUENCE OF COLORS ON HEALTH. — A chemical authority classifies colors according to their influence upon health. Colors dangerous to health are orpiment, realgar, biniodide of mercury, turpeth mineral, arsenite of lead, white lead, litharge, minium, Naples yellow, oxychloride of lead, arsenite of cobalt, verdigris, Scheele's green, Prussian blue, Prussian green. Less dangerous are chromate of lead, vermilion, sulphide of tin, mineral lake or chromate of tin, chromate of copper, purple red, Thenard's blue, oxide of zinc, chromate of barium, oxychloride of antimony, sulphide of cadmium, smaltz, ultramarine. Colors not dangerous include sulphate of barium, yellow and red ochres, Venetian red, cochineal, manganese brown, raw and burnt umber and sienna, sepia, indigo and colcothar. — *Invention.*

A GOLD-PLATED RUSSIAN PALACE. — Just outside St. Petersburg the Czar has a palace known as Tsarskoe-Selo, which was built by Catherine the Great. It is of vast extent, and plated with gold. It is said that nearly £200,000 worth of bullion was used in doing the work, and when, owing to the dampness of the climate, the plating began to peel off, Catherine ordered it to be painted over. Some Russian speculators wanted to scrape off the old gold and melt it over again, and offered Catherine £100,000 for permission to do so, but she sent them to prison for insulting her with the proposition, and covered the palace with yellow paint. This palace has rooms walled with amber. It has a parlor covered with lapis lazuli, and the walls and ceiling of one drawing. — *Invention.*

CHURCH BELLS AND CANNON. — When Peter the Great ran short of metal for casting his cannon, he made no ceremony of appropriating church bells to his warlike purposes. Since the time of the "Iron Czar" the old order of things has changed, and, with a sort of poetic justice, the church in Russia is now receiving reparation for Peter's despoliation of her belfries. We are told that six bells, cast from copper cannon, captured by the army of the Caucasus, have just been landed at Petrovsk for the orthodox churches in Daghestan. The bell-founders are engaged in the conversion of a further large number of copper guns to the same laudable purpose. Thus does "the whirligig of time" bring about its revenges. — *Invention.*

CURIOUS ORIGIN OF A FIRE. — The other day a heavy delivery-wagon backed up in front of an Eighth Avenue furniture store. The smoothness and slant of the asphalt gave greater momentum than was expected, and the hind wheels struck the curb with a crash. The contact of stone and iron drew out sparks. Some of these flew into a wisp of packing hay, that soon gave forth smoke and flame. A bucket of water subdued the blaze, but, as a fireman remarked, it was an interesting object-lesson on one of the mysterious ways in which serious fires sometimes start. — *N. Y. Sun.*

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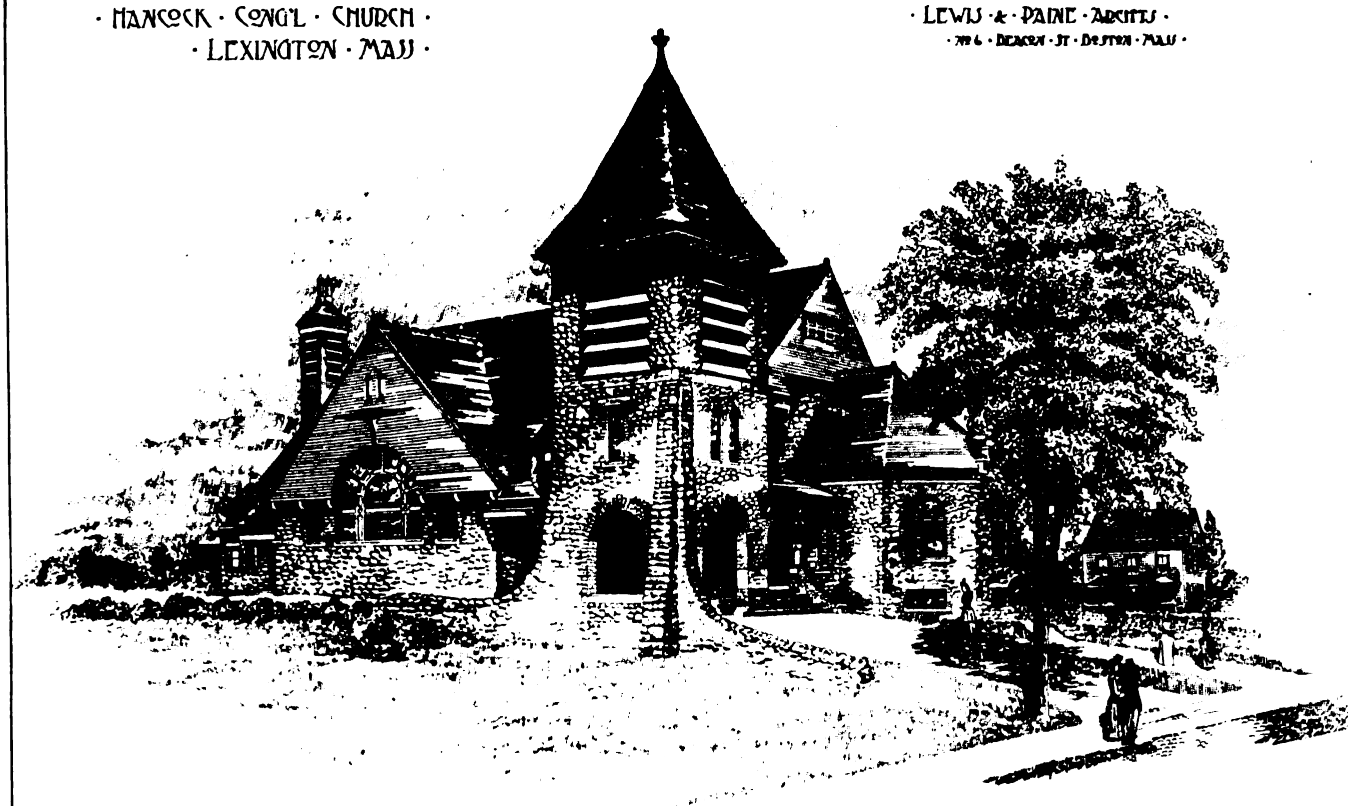
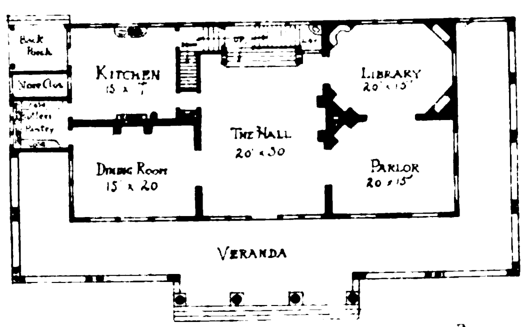
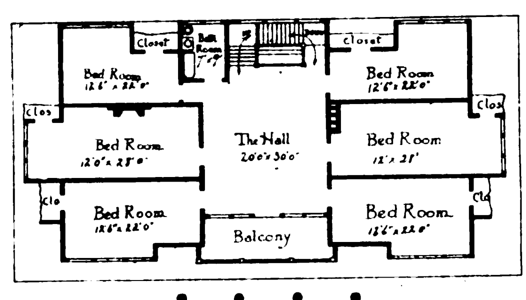




First Story Plan



Second Story Plan

Manly N. Cutter
ARCHITECT
203 BROADWAY NEW YORK CITY

HOUSE AT TARRYTOWN · N · Y ·

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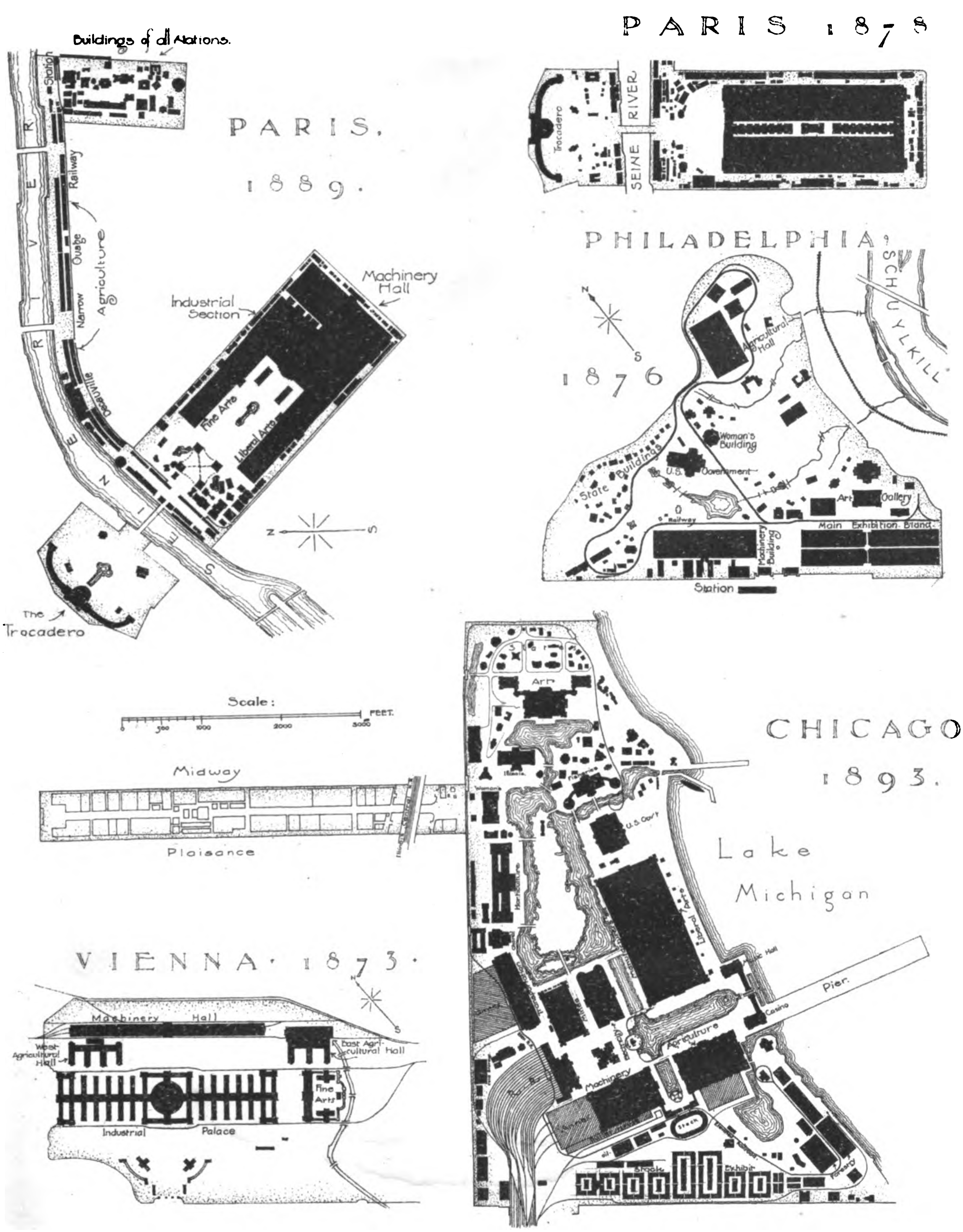

PLANS, drawn to same scale, OF INTERNATIONAL EXHIBITION'S, showing comparative areas.

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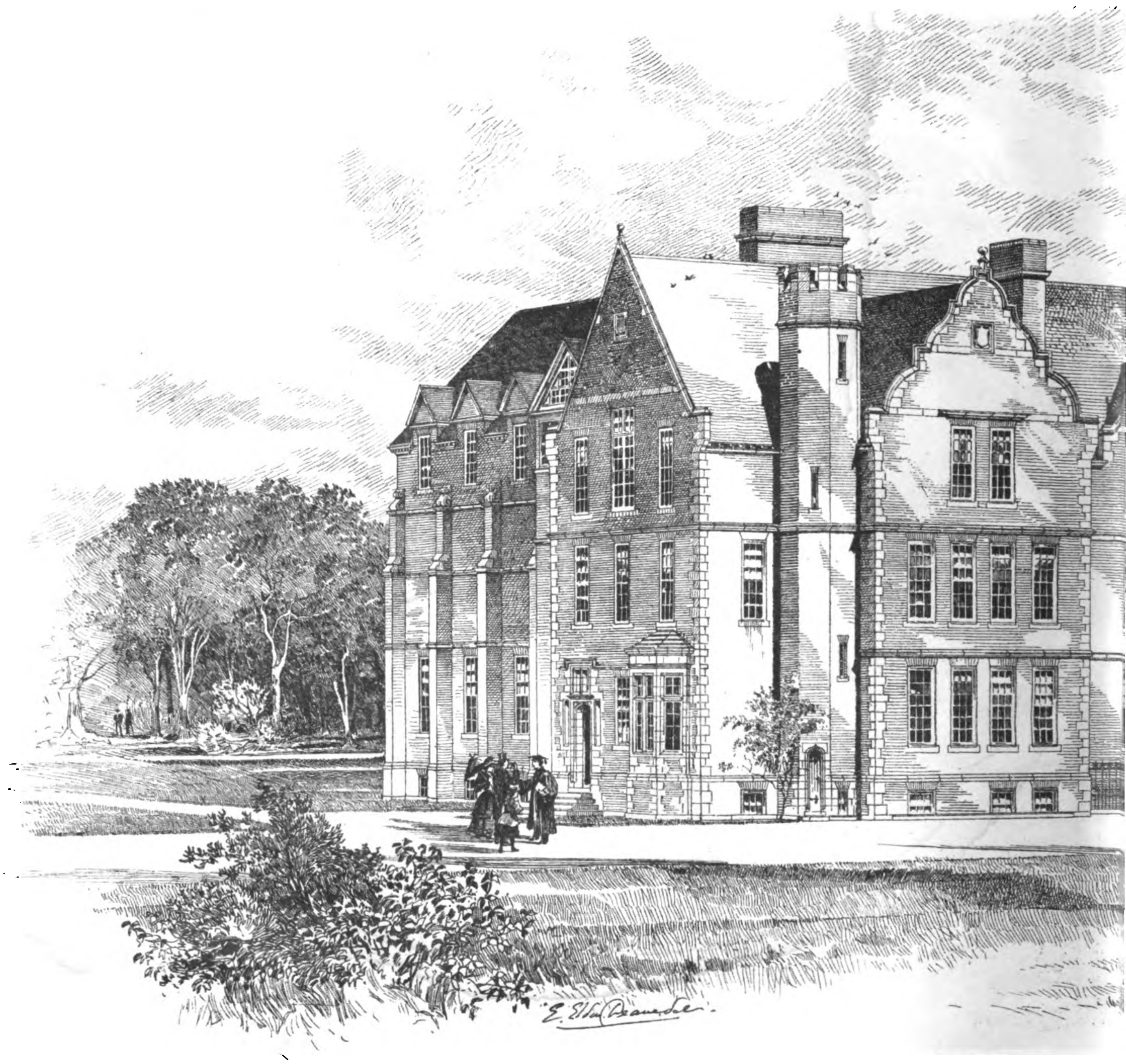

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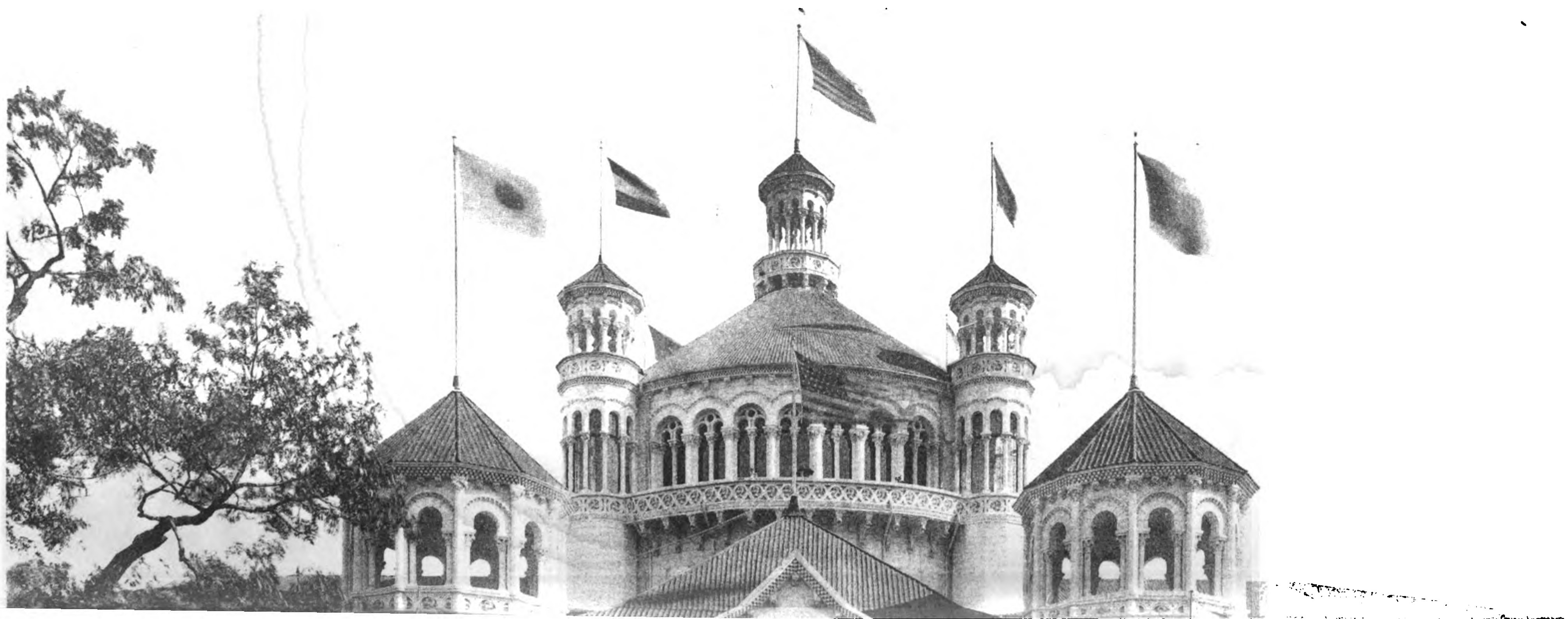

CENTRAL PAVILION OF THE FISHERIES BUILDING, WORLD'S FAIR, CHICAGO, ILL.

HENRY IVES COBB, Architect.

HELIOTYPE PRINTING CO. BOSTON

THE AMERICAN ARCHITECT AND BUILDING NEWS.

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OCTOBER 14, 1893.

CONTENTS

BOSTON architects, besides many friends outside the city and the profession, will regret to hear of the death of Mr. Benjamin Franklin Dwight, which occurred last week. Mr. Dwight was born in Boston, and after a short experience in a mercantile house, studied his profession in the office of the late George Snell, and afterwards formed a partnership with the late Arthur Gilman. With him he built a number of city and country houses. After the dissolution of this partnership Mr. Dwight continued in business alone, and designed the Studio Building; several of the large houses on Arlington Street; Selwyn's Theatre and the connecting buildings; and, after the fire of 1873, the Globe Theatre. Of large buildings he also built the Worcester Music-hall, the Gloucester Town-hall, a group of buildings for the Military Asylum at Togus, Maine, Hotel Berkeley, the Hathaway Building and the first of the large wool warehouses on Atlantic Avenue, the Eastern Express building, corner of Washington and Water Streets, the Burnham stores on Washington Street, all in Boston, the Educational Institute at Raritan Bay, one or two churches, and other buildings of more or less importance, and many dwellings. Never a robust man, his health had been seriously impaired of late, though he still continued the practice of his profession. Like his brother, the late John S. Dwight, he was interested in music, and was an accomplished French scholar, speaking the language fluently. He was an active member of the old Boston Art Club, which frequently met in his office; and he aided efficiently in the first of the public exhibitions and receptions of the Club, which were held in what was then known as Allston Hall. He was a man of the kindest disposition, and although his professional life was what would be called a quiet one in these "plan-factory" days, few architects leave more sincere friends behind them at the end of their career.

MR. BENJAMIN C. MILLER, the hero of the extraordinary operation by which an immense hotel was dragged by locomotives to a more favorable site, has recently moved a large brick railway station, on the New York Central Railroad, forty-seven feet to a position on a new alignment of the roadbed. The building is two hundred feet long and forty feet wide, and is said to have been transported without accident. It may, we think, be justly claimed that no work done in this country demonstrates more clearly the fertility of resource and accuracy of observation of the best type of American mechanic, than that performed by the great building-movers. It is easy to say that long practice has made them familiar with the business, but, in fact, the moving of every large building involves new problems, all of which must be met successfully, or the operation will fail, and the contractor will be ruined. To meet the difficulties which continually present themselves, the building-movers use many different devices, and a book recounting the history of the principal enterprises of the kind would be very interesting reading.

WE heard once of a contractor, in a large city which we will not name, who agreed to put in concrete foundations for a building. The method which he employed for carrying out his contract presents so many advantages — for the contractor — that it is worth mentioning. His first step was to fill in the trenches with ordinary gravel. He next opened some barrels of cement, and strewed their contents on the surface of the gravel; and finished his task by playing a stream of water from a hose over the whole, for such time as he thought judicious. What was the fate of the building erected upon these foundations we do not know, but the story is recalled to our mind by the description of an attempt to manufacture concrete *in situ*, by forcing dry cement powder through a tube into a layer of sand, submerged in water. The cement was blown by an air-blast through three holes, each three-eighths of an inch in diameter, in the end of the tube, which was inserted in the sand to be treated. The air-blast loosened the sand, so that the cement was rapidly blown through it, and on the cessation of the operation, the sand settled back into its place. The resistance of the concrete formed in this way does not appear to have been tested, but the particles are said to adhere very firmly together. It is curious that the operation compacts the sand materially. A given volume of submerged sand, after having one-fifth its bulk of cement blown into it, was found to occupy less space than it did originally, and the surface of the concrete piers, after the process was completed, was depressed below that of the surrounding sand.

THE *Builder*, in a review of Mr. W. M. Patton's book on Foundations, makes a remark which we hope will not be taken seriously. It is well known that the *Builder* looks with a rather unfriendly eye upon American ways, and its reviewer discovers many evidences, in American practice in foundation work, of the national endeavor "to cut things fine," or, in more intelligible language, to incur risks for the sake of saving a little money. One of the matters in which the Americans, it thinks, show this disposition, is the choice of cement for foundation work. "The cement used is," it says, "apparently always of German or native production, and is inferior in grade to most English Portland cements"; and it adds that "one reason, and the chief one, why English cement is not more used in the States is that it is of too high a quality to compete in price. If our manufacturers wish to supply the American market, they must fit their goods to the quality that satisfies that market, and they will then be able to make their price both lower and more profitable." We imagine that the unanimous comment of American engineers and architects on this suggestion would be that English cement, although less used in the United States now than it was a few years ago, is still employed to quite as great an extent as much of it deserves to be, and that any English manufacturer who should follow the *Builder's* advice, and attempt to extend his sales in America by reducing the quality of his goods, would find his cement rejected by all respectable architects and engineers.

IT is astonishing, after the endless troubles and discouragements that our architects have been through within the last ten years, in the endeavor to find a brand of English Portland cement in the American market any two barrels of which would have the same properties; which was packed in such a way as not to have a considerable part of each consignment spoiled by dampness; which would set in something like a definite time, if at all; which was so thoroughly and evenly ground that a specified and maximum proportion of sand could be used with it; and which could be depended upon not to swell after setting, and burst the masonry laid with it, to find a high authority explaining to its English readers that the feeling of uncertainty which the name of English Portland cement excited in American architects and engineers was due to its superior quality, and consequent high price, and that the best way to overcome this prejudice was to reduce the quality. The *Builder* ought to know that the brands of German Portland

cement used in the United States cost more than any of the English brands commonly found here, and the obvious reason why they have been pushing the English cements out of this market is that our engineers and architects, finding them, as a rule, more uniform than the English cements, have compelled their use, against the resistance of contractors, who have clung long and fiercely to the cheaper English brands. That the competition of the American Portland cements, which are rapidly improving in quality, affects the importations from England is, undoubtedly, true; but the way to meet this competition, as, in general, to retain a sure hold on the American market for anything, is to provide the best goods that can be made, — not the worst.

THE coroner's jury in the case of the accident at the Chester Bridge, on the Boston & Albany Railroad has brought in a verdict, fixing the immediate responsibility for the accident on the foreman in charge of the affairs on the bridge, but holding the railroad company ultimately responsible. This verdict accords with the judgment of the State Railroad Commissioners, who considered the bridge-repairers in fault for the carelessness which led to the disaster, but held that the railroad company was also negligent in allowing trains to be run at full speed over a bridge, already of doubtful strength, in process of repair, and in allowing such repairs to be carried on without deputing some one to see that its trains were not endangered. It is due to the railroad company to remark that its reputation for care of its passengers is very good, and this is said to have been the first accident to passengers on one of its trains for which it was held accountable; but it is not so pleasant to learn that the company is reported to have utilized its rather flimsy pretext for avoiding responsibility as a means for making favorable settlements with some of the injured parties. The story is, for example, that the widow of one of the men who was killed by the accident was persuaded to accept five hundred dollars in full satisfaction of her claim by the argument that the railroad company was not bound to pay anything, and that she had better take that than nothing. Supposing this story to be true, which we hope is not the case, it would be interesting to know whether such a settlement would be legally binding. If the railroad company had been directly in fault, and had only pretended not to be in order to defraud a person having a just claim upon it, there is no doubt that the receipt in full would be set aside, and that the claimant could recover adequate damages, notwithstanding the receipt; but, at the time of the settlement, there might be said to have been a reasonable doubt of the legal responsibility of the company, and a lawyer might argue that the claimant and the company had this in mind at the time of the settlement, which was, therefore, made in good faith, and was conclusive on both parties. What view a court would take of the question will probably never be known, as the claimants are presumably too poor, even if they exist, to press the case, but it might form a curious topic for discussion in law-school courts. Meanwhile, the more prudent among the injured people have waited until the responsibility was fixed on the company, and have commenced suits for damages to an amount which will probably diminish materially the surplus in the company's treasury.

LA SEMAINE DES CONSTRUCTEURS has something to say about the massacre of Italian by French workmen at Aigues-Mortes, which has a certain interest, from its similarity to the talk of politicians here. After speaking in a rather slighting manner of the "rows" at Aigues-Mortes, it says that they must be attributed to the fact that French workmen are, relatively to the Italians, well educated, and have their intelligence and sentiment, "in one word, their faculty of enjoyment," more developed, and that, in consequence of this, they need higher wages than Italians and Belgians, "generally habituated from infancy to filthy surroundings, and to food consisting of macaroni or rye-bread, and almost totally devoid of even elementary instruction"; the result of which is that, on seeing their employment taken away from them by foreigners, who can afford to work cheaper than they wish to, they utter protests, somewhat "brutally expressed." It would seem to the ordinary mind as if the French workmen's "superior intelligence" and greater instruction had not done him much good if they had not made him more valuable to his employer than a "filthy," macaroni-eating Italian, but French officials do not reason in that way, and an ordinance has already been introduced in the Municipal Council of Paris, and a similar one in the General Council of the Department of Meurthe-et-Moselle, prohibiting contractors for public work, under penalty, from employing more than one foreigner to every five French citizens. It does not appear that the ordinance has, in either case, been adopted, possibly because some one has pointed out that a great many Frenchmen are employed in foreign countries, and that reprisals in kind by the governments of these countries, in reply to discrimination against their subjects, might have unpleasant consequences; but the temper of the country seems to favor some sort of "protection of labor," and we shall probably see some instructive experiments tried.

THE German technical papers are remarkable for the practical receipts which they contain; not that our own journals do not contain practical receipts, but because those in the German papers, instead of being copied from ancient receipt-books or concocted at random, usually bear the name of some well-known scientific man, and are based on reasoning as well as experience. One of these receipts, by Herr K. Keyfar, is copied in the *Bautechnische Zeitschrift*, and is worth remembering by architects, as well as by steam-fitters and plumbers. As is well known, the cement used for making tight the joints of steam-pipes and other ironwork exposed to heat and pressure is a pinkish putty, now commonly made with a mixture of white and red lead, although it is not long since pure red lead was supposed to be the only proper material. This lead-putty is, however, according to Herr Feyfar, often carelessly and ignorantly made, so that it fails, sometimes to a dangerous extent, to do what is required of it. Properly, the cement for putting together steam-pipes should be made with equal parts of pure red and white lead, thoroughly mixed and well kneaded with pure linseed oil, which has been rendered drying by boiling with ten per cent of red lead. Workmen in steam-fitting shops do not know much about the properties of oils, and often mix their putty with raw linseed oil or grease, or even kerosene. It is hardly necessary to say that coal-oil is soon volatilized by the heat, leaving the white and red lead in the form of powder. Grease is not much better, and raw linseed oil hardens slowly, and should not be employed. Where the materials are suitable the putty sets quickly, and becomes so hard that it can with difficulty be cut with a chisel. The mixture of red and white lead has certain advantages over either separately, which should be understood. Red lead alone gives a hard and quick-setting cement, but the red-lead putty is not very plastic, and does not cling well to the surfaces of the iron. White lead alone makes a plastic and adherent putty, but while red lead gives up a part of its oxygen to the oil, so that a red-lead putty hardens all through, white lead does not yield oxygen, and a mass of white-lead putty hardens only on the surface, remaining for a long time soft in the interior. A mixture of the two substances combines the advantages of both. In kneading the putty, care should be taken not to allow iron filings or bits of dust to get into it. Where the joint is not to be exposed to heat, chalk may be added to the putty in quantities equal to that of the white lead. If the drying must be hastened, a little brown oxide of manganese, very finely ground, will help it. For hot joints, finely-ground graphite, in quantity equal to the white lead, may be added, but the graphite cement does not set so quickly as the lead alone. The surfaces to be joined should be even, as left by the turning-lathe or planer, but the putty will not stick well to a polished surface. Where the putty alone must support a severe pressure, as in the case of a flange-joint in a steam-pipe, it is best to strengthen it by inserting in the joint a piece of paper or felt, covered with putty on both sides, and if the joints are very rough, as in the case of flanges which have not been turned or planed, it may be best to mix some threads of hemp or flax with the putty, but care should be taken not to use too much. Where the joint is exposed to great heat, no combustible substance, such as flax or hemp, is suitable, and the best way is to cut out a piece of wire gauze, spread it thickly over with putty, and lay in the joint. It is sometimes necessary to make steam-tight joints in such a manner that they can be readily taken apart and replaced, as in the case of the man-hole of a boiler or the head of a cylinder. For making these joints the lead-putty is unsuitable, as it becomes too hard to be easily removed, and it is best to employ felt or soft paper, soaked with boiled linseed oil. If possible, sheets of such paper should be previously prepared by soaking with the oil and drying, and, when used, they should be cut to the proper shape, covered on both sides with boiled oil and laid in the joint.

THE BURGUNDIAN SCHOOL OF ARCHITECTURE.[1] — I.

DURING the Mediæval and Renaissance periods Burgundy was one of the most important artistic centres of France, and its influence in the development of architecture and sculpture extended far beyond the limits of the province; it may be seen asserting itself even in the Cathedral of Langres (Haute-Marne), in Switzerland in the Cathedral of Lausanne, in Ile-de-France in the Castle of Saint-Germain-en-Laye, where the chapel is based on the Burgundian constructional system of the thirteenth century, and lastly in a large number of edifices in Bourbonnais, Lyonnais and in the north-east.

In religious monuments, this school at first adopted the longitudinal barrel-vault for covering the lofty naves, which it attempted to buttress with groined vaults over the square bays of the side-aisles; as for instance, in Notre-Dame at Beaune (Fig. 1), one of the largest churches of the region; but this system which might have been applied, if absolutely required, to edifices of restricted dimensions, was not feasible for naves of such vast proportions, which, moreover, the builder essayed to light in the upper part by means of openings above the roofs of the side-aisles: this disposition necessitated carrying the walls up to a great height, and, of course, caused a tendency in them to bulge under the pressure of poorly buttressed barrel-vaults.

But, under the influence of the powerful school of Cluny, Burgundian architects were not slow in recognizing the defects in the course adopted, and we find them making persistent efforts at recovery, which soon produced a remarkable result, the bearing of which on the general architectural progress of the thirteenth century was moreover destined to be considerable. Thus, in the porch of the beautiful Church of Vézelay we see in the twelfth century an application of this new system of construction to the lofty vaults; they are established on a rectangular plan and the thrusts are borne, more or less skilfully it is true, on the piers and buttresses (Figs. 2, 3). These vaults are themselves very remarkable in this respect: while exhibiting the ribbed disposition they do not reproduce the antique vaults based on the intersection of cylinders, but follow a peculiar trace designed to make them less bulging, diminish the thrust and facilitate their construction without a preliminary diagram; here we see for the first time diagonal ribs developed in a semicircle, a principle which Gothic builders adopted from the close of the twelfth century in the conception of the vaulting that forms the basis of their entire system and that has admitted of most varied and wonderful applications.

Independently of this progress in the general conception of religious edifices, Burgundy, which had at first been subjected to Gallo-Roman influence, was not long in giving an original stamp to its artistic productions, as will appear from an examination of the trace of the piers and arches of the old part of the church of Notre-Dame at Beaune and of the porch of Vézelay; the proportion of these robust orders is excellent and the details are strong and skilfully treated. The ornamental sculpture and the statuary furnish us likewise proof of the remarkable aptness of the artists of the province. The porch of the Cathedral of Autun, and more especially that of Vézelay, are masterpieces of composition and are besides admirably executed in certain parts. Though Byzantine influence makes itself felt at the point of departure, at every step in these works an interpretation of nature, which was much studied, is observable, as well as a sentiment quite strikingly distinctive.

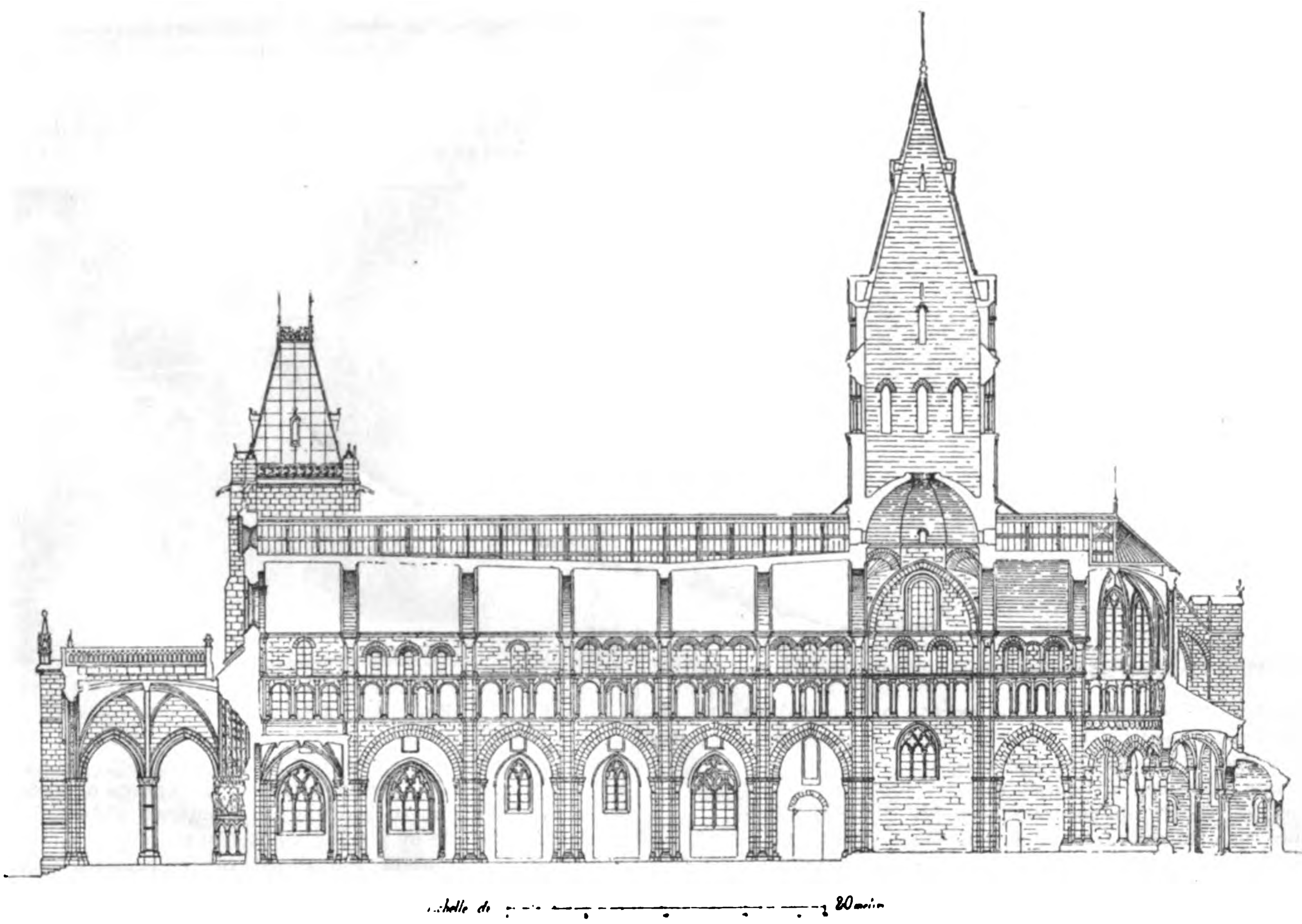


Fig. 1. Longitudinal Section of Notre-Dame at Beaune.

It is important, before passing to a discussion of the Burgundian architecture of the thirteenth century, to follow carefully the development from this centre during the Romanesque period, in the domain of sculpture as well as architecture, for it is quite obvious that the special character manifested by this school in Gothic times is due to earlier efforts, as it is, also, a consequence of the use of peculiar materials. The use of antique tiles, which prevailed for a long time, naturally gave an individual aspect to these edifices, on account of the slight slopes, particularly above the side-aisles, since there resulted a special disposition in transverse section.

On the other hand, the dimensions and the peculiar resistance of the Burgundian limestone furnished the province with exceptional elements, which, moreover, its constructors were able to utilize with extraordinary skill, as is proved by all of

[1] From the French of A. de Baudot, in Planat's *Encyclopédie de l'Architecture et de la Construction.*

the thirteenth-century edifices, and especially by Notre-Dame of Dijon. If, for example, the plan of the porch (Fig. 4) is examined, one will be struck by the slenderness of the piers, which are built of large stones and surrounded with columns, cut contrary to the cleaving grain and introduced with surprising art that savors in no way of audacity, but which is the outgrowth of experience acquired in the development of an order of ideas rational if not scientific. The same order of

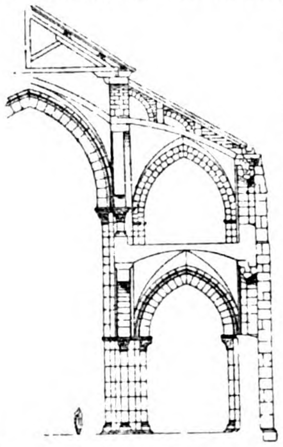


Fig. 2. Transverse Section of the Porch of the Church of Vézelay.

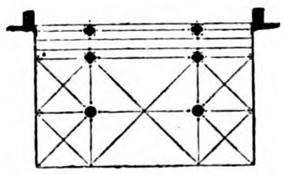


Fig. 4. Plan of the Porch of Notre-Dame at Dijon.

ideas is likewise maintained throughout the conception of the construction, and the monument, therefore, exhibits qualities of harmony not often existing to the same degree (See sections

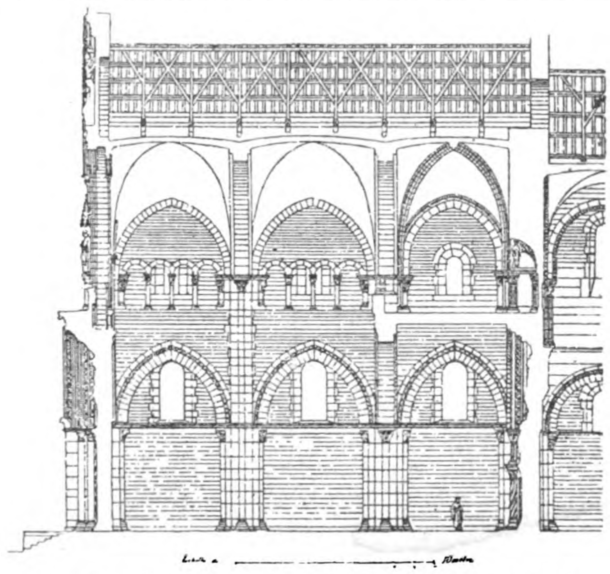


Fig. 3. Longitudinal Section of the Porch of the Church of Vézelay.

and apse, Figs. 5, 6, 7). But worthy of especial attention is the arrangement of the bays of the nave; in these, the lightness due to the use of the materials furnished a unique solution, of which an accurate idea may be obtained from the per-

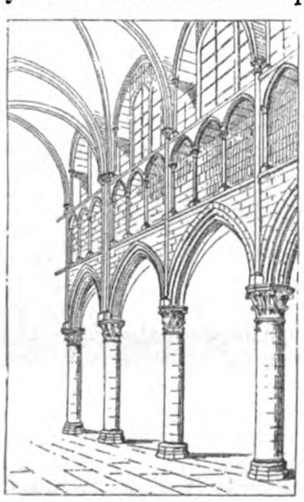


Fig. 5. Nave of Notre-Dame at Dijon.

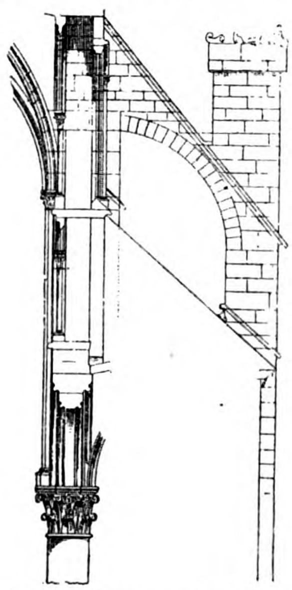


Fig. 6. Transverse Section of Notre-Dame at Dijon.

spective view and the section. In examining the section, the student will notice the ingenious means adopted in loading by the upper dispositions, the slender, isolated piers of the nave, and in conditions such that the vertical pressure strengthens the piers. In the management of the upper galleries, we detect an effort to reduce to a minimum the material employed, with a view to economy, and at the same time with the intention of rendering expressive, from an artistic standpoint, this disposition, which, in principle, derives its *raison d'être* from the constructional system; in such a process the architectonic sense could not be overlooked; hence the pregnant source of instruction afforded by these conceptions, which admit of the most rigid analysis, and therefore offer a compositional method which is capable of wide application. On the other hand, these solutions suggest the way in which it is possible in the general dispositions so to reduce the points of lower support as to facilitate circulation and harmonize structure and form; that is to say, answer at the same time both rational and artistic demands. Particularly will one remark, in this respect, the system of ceiling adopted between the formeret arches of the vaulting and the external walls, and intended to aid in the introduction of light; it is also a result of the constructional system.

Before quitting this interesting edifice, we must call the reader's attention to the arrangement of the buttresses and flying-buttresses, the details of which may be studied in the transverse section. For motives that cannot be indicated here, and which are, moreover, of little importance, the builder was led to reduce the projection, in comparison with what is usually done in such cases, and, consequently, the section of the external buttresses as well; and yet he was obliged to look to these

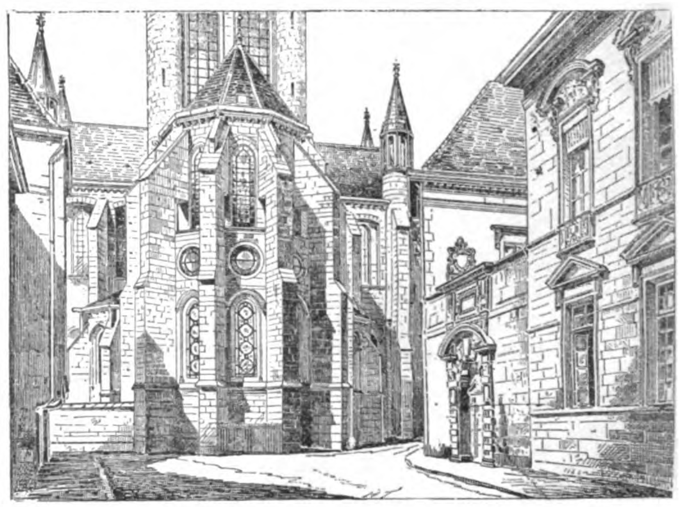


Fig. 7. Apse of Notre-Dame at Dijon.

piers to support the thrust of the lofty vaulting. At the outset, the architect, taking advantage of the system of corbelling which enabled him to provide for a buttress above the roof over the side-aisle by placing a lintel in the upper part, established at the point of the thrust of the vault a powerful shouldering wall-piece, and thus supported a part of the action to begin with; then skilfully, by means of a very reasonable mode of laying the stones, weighting the buttressing pier with a lofty pinnacle, he assured the equilibrium of the whole.

[To be continued.]

Accident to a Picture by Burne-Jones. — The news that Mr. Burne-Jones's well-known picture "Love among Ruins" has been completely destroyed past all hope of reparation will seem to many people to whom English art is dear little short of a national calamity. The picture was entrusted by Mr. Burne-Jones to a well-known firm of art publishers, at their urgent request, for the purpose of reproduction by process, and not only did the publishers know that the picture was a water-color, but Mr. Burne-Jones had even taken the precaution to affix a label on the back of the work stating its medium and that any moisture would be injurious thereto. In spite of this the picture was apparently confided to some ignorant employé, who covered the whole surface with a preparation of white of egg. The result is the destruction of all the final touches and finished tones. The faces and hands are smeared and blurred, and, in fact, one of the records of the life of one of the greatest painters of this or any century is practically wiped off the roll of fame. When one remembers the crowds that collected before "Love among Ruins" on each occasion of its being exhibited to the public, one gets some faint inkling of the indignation and dismay which the news of its destruction through carelessness has spread broadcast among all lovers of art. — *Edward Yates in the New York Tribune.*

OFFICE-HELP FOR ARCHITECTS.[1] — XX.

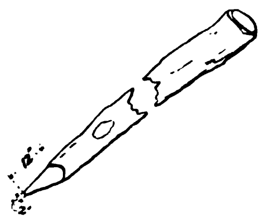


Fig. 92.

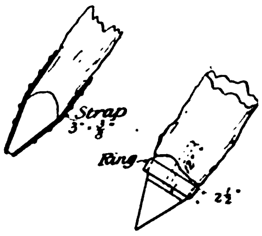


Fig. 93.

SECTION IV. — SUBSTRUCTURE:

§ 269. Materials: — Piles, sheet-piles, timber-cribs, sand or gravel fills, sand piles.

§ 270. Piles: — Wherever buildings or other structures rest on a compressible soil, and where the soil is not homogeneous, and the conditions permit, piles make the best of all substructures.

Materials: — May be of oak, spruce, hemlock, cedar, yellow pine, palmetto, cast-iron, wrought-iron or steel.

Classes: — (*a*) Those which, passing through a soft homogeneous material, bear on gravel, rock, or are deeply bedded in sand, and which may be considered as columns. (See Chapter III, "Columns.")

(*b*) Those which pass through a non-homogeneous material, and which must be considered as resisting the weights by skin friction, to be on the safe side. (See Table XXIX.)

Preservation: — All wooden piles must be cut off below the lowest point at which the water in the soil is known to stand. An exposure of three or four weeks to the air after being saturated, will almost surely set up rot and result in the ultimate destruction of the pile.

Piles exposed to sea-water must be thoroughly impregnated with creosote, dead oil of coal-tar or some mineral poison, to protect them from the "teredo," a worm which will bore through an ordinary pile in three or four years, completely honey-combing it.

Metallic piles should be of cast-iron and asphaltum coated in the best manner.

§ 271. Wood Piles: *Driving:* — See that all piles are practically straight and sound. Cut the butts off square, chamferring the edge slightly. Trim off all knots and branches smoothly with an axe. Point with an axe making the point about 12″ long, and about 2″ square in the end (Fig. 92).

Whenever the penetration is less than 4″ under the blow of a 1,200 pounds hammer, falling 15′ 0″, secure the head against brooming by putting on a ring 2½″ wide, ⅝″ thick, and 1″ less in diameter than the least diameter of the head of the pile.

When driving into compact gravel or rotten rock, protect the point with a wrought-iron strap 2″ wide, 48″ long, spiked to the point with five spikes, or else cut the point off square, bore a 1¼″ hole in the end, and fit in a cast-steel shoe with a dowel end 12″ long and secure the point against splitting by using a 3″ x ½″ ring (Fig. 93).

The proper length should be determined generally by test bores or by test piles, but the driving should be carefully watched all the time to determine the proper depths, as in non-homogeneous ground there will be a considerable range.

In supervising pile driving, observe the following points:

(*a*) Keep the pile plumb.

(*b*) When the penetration is small, and the piles spring under the hammer, drive with a small fall (5′) and quick blows.

(*c*) When driving into gravel, drive one pile as far as possible, or until the head begins to broom badly, noting each penetration.

If penetration is uniformly decreasing, for from 6′ to 10′, drive the succeeding piles only 2′ or 3′ into the gravel. If the penetration is irregular, and begins to increase just before you stop, or if the succeeding piles show much change in penetration, sink a test bore down at least 10′ below the point of pile, as probably you are near the bottom of the stratum, and may be over a soft one.

(*d*) If the stratum is 6′ or more in depth, stop the driving as soon as a penetration of 2′ into the stratum is had. If less than 6′ drive through it, unless it is below the depth given in the piling table, and proportion the weight accordingly.

(*e*) Whenever a pile "brings up" (acts as though it had reached rock) before it reaches the average depth, try it with several light blows, and if it still refuses to move, cut it off, and drive another pile beside it.

(*f*) In driving into sand, use a duplex pump 6″ x 4″ x 6″, with 2″ suction, and 1½″ discharge; connect discharge end with a 1¼″ pipe of length = pile length + 5′, through 1½″ hose, of length equal pipe length + whatever is necessary to reach one dozen or more piles without moving pump, by means of one reducer and one quarter-bend.

Start pump, and place pipe beside pile, with hammer resting on pile, but with the fall almost taut, and pile will descend under weight of hammer or under light taps very readily. One machine should easily drive 100 piles per day if spacing does not exceed 3′ 0″, *c* to *c*.

Length of pile should be such as to carry point 10′ 0″ below the lowest point that disturbance is likely to reach. Bearing value of pile may then be computed as a column 10′ less in length than the pile.

It will be found nearly impossible to drive a pile deeper four hours after the water-jet has been withdrawn, except the jet be used again.

(*g*) Fix the cutting-off point so that the pile will always be immersed in water.

(*h*) Piles exposed to tidal waters must be charred and impregnated with creosote or dead oil of coal-tar, say 12 pounds per cubic foot. Palmetto timber is said to resist the teredo without treatment.

(*i*) It is immaterial whether the fall is automatically loosened from the hammer or not.

Cutting: — When spaced 3′ 0″, *c* to *c*, or less, piles should be so cut as to leave the heads smooth, sound and so near level

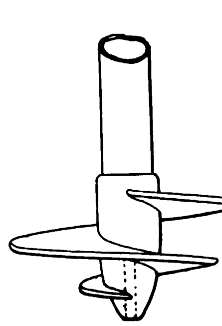


Fig. 94.

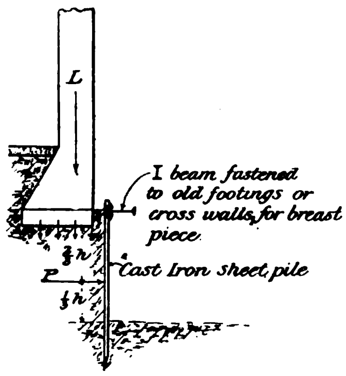


Fig. 95.

that of a dozen heads examined, no one or part of one shall be at a greater distance than 1″ from a plane passed through all at their average height.

No rough edges, chips or vertical inequalities should be permitted. When spaced more than 3′ 0″, *c* to *c*, the pile-heads

[1] By George Hill, Consulting Engineer. Continued from No. 928, page 7.

ABBREVIATIONS AND SYMBOLS.

= equal to.	∴ therefore.
‖ parallel to.	□′ square feet.
÷ divided by.	□″ square inches.
× multiplied by.	8* read 8 pounds per lineal foot.
+ added to.	[channel bar.
a^2 a multiplied by itself.	I I-beam.
$a > b$: — a greater than b.	T T-iron.
$a < b$: — a less than b.	L angle iron.
$\frac{a}{b}$: — a divided by b.	⊥ deck beam.
	● round section.

I ton = 2,000 pounds as this is the conventional ton, the legal ton is 2,240 pounds, but is rarely used.
l = the length between supports of any beam or girder or height of any column, always in feet.
b = breadth of any beam or girder, always in inches.
d = depth of any beam or girder, or the least transverse dimension of any column, always in inches.
L = total load uniformly distributed coming on any piece in pounds.
$L^{\square'}$ = " " " " per square foot in pounds.
W = concentrated load on any piece in pounds.
s = span of any arch or truss between centres of end pins in feet, or spread of footing courses.
A = area of any section in square inches.
M = maximum bending-moment in inch pounds.
n = distance of centre of gravity of section from either top or bottom edge in inches.
I = moment of inertia, neutral axis through centre of gravity.
R = moment of resistance of section.
r = radius of gyration, in inches.
Sc = safe compressive strain in pounds per square inch.
St = " tensile " " " " " "
Ss = " shearing " " " " " "
S = strain per square inch in extreme fibre.
P_e = upward reaction of support at left-hand end of beam.
P_f = " " " " " right " " " "
e = distance of centre of gravity of load from left hand of beam.
f = " " " " " " " " right " " "

should be cut off absolutely plane, and so nearly level that no pile should be more than $\frac{1}{4}''$ above or below its neighbor on both sides, or $\frac{1}{4}''$ away from the predetermined level.

Finishing: — When piles are spaced more than 3′ 0″, *c* to *c*, finish with a timber crib as described later, fastening the crib to the pile with oak treenails 3′ 6″ long, roughly $1\frac{1}{2}''$ square,

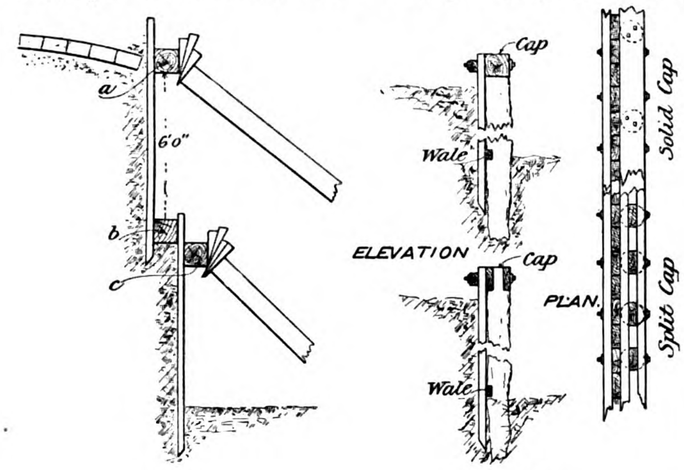


Fig. 96. Fig. 97.

and driven into a hole $1\frac{1}{4}''$ diameter. When spaced 3′ 0″, *c* to *c*, or less, thoroughly clean away all chips, etc., and excavate to a depth of 8″ below the pile-heads, then fill-in to level of heads with two courses of concrete, well rammed, then cover with 18″ of concrete; then start footings.

Spacing: — 12″ piles may be spaced a minimum of 18″, *c* to *c*, but better results are had when the spacing is wider. Piles should generally be spaced in pairs.

Loading: — Examples exist of piles having carried 80 tons without settlement, but the writer would strongly advise against loads exceeding those given in the tables, unless it is impossible to do otherwise, and then the best of engineering advice should be sought.

For any spacing or arrangement, make a layout for six, eight or ten feet, and divide the number of piles obtained by the number of feet run, counting the $\frac{1}{2}$ piles at beginning and ending of space.

§ 272. Metal Piles: *Classes:* — (*a*) Screw-piles. (*b*) Disc-piles. (*c*) Cylindrical piles. (*d*) Sheet-piles.

Uses: — Usually employed where a portion of the piles must be exposed to severe transverse strains, as in ocean piers, light-houses on shoals, sinking pits beside and below foundations that it is undesirable to shore and underpin.

Used also as securing longer life than wood piles under conditions unfavorable to wood.

§ 273. Screw-piles: *Driving:* — Screw-piles should be helical with the width of the blade a maximum for one full turn, and then rapidly diminishing into shank and point (Fig. 94); screw usually made of cast-iron, with either a threaded or bolt connection to the pile proper. If threaded, the threads should be keyed so that the pile can be withdrawn. Should only be driven through material measurably free from logs, stones, etc. In driving, build a trestle with provision made for holding the pile during driving, and a working-platform; the pile is then put into position, made truly vertical, a wrench put on, or the pipe grasped with pipe-tongs and screwed down by the men walking around. As the pile goes down, the wrench or tongs are shifted up until the pile is in position. The sinking is very much facilitated by the use of a tightly-fitting cap on the pile-head, to which a $1\frac{1}{2}''$ pipe is connected from the delivery end of a pump, the water that is forced in being discharged through an orifice in the point of the pile. Should the pile cant, or show a tendency that way, it can generally be corrected by the use of a water-jet similar to that described for a wooden pile — first on the side that seems to have the most resistance, and then all around the pile.

Often a disc on the end of a pile can be put down by means of the jet as readily as the screw-pile, but then two jets should be used. In setting screw-piles, they can generally be brought to exact grade, but disc-piles cannot without an expenditure of labor greater than that involved in cutting them off.

§ 274. Cylindrical-Piles: — Should be driven in manner similar to wooden piles, the head being protected with a cap, for sizes up to 15″. Beyond this size they are seldom advisable; should be driven with a hammer very slowly, and the material inside kept within 1″ of the bottom by using a sand-pump of large dimensions. A jet kept working around during the driving will greatly facilitate it. Cylindrical-piles of 2′, 3′, 4′ or more in diameter are often used in pairs, and for pier and bridge foundations in very soft material, and often give excellent results. They are also used in very much greater sizes than the above singly. The material removed from the inside is usually much in excess of the volume occupied by the pile, and, must be carefully guarded when used near a building.

Cutting: — Any one of the several pipe-cutters in the market can be used for this purpose, but care should be taken to make the cut perpendicular to the axis of the pile. If the pile is slightly out of plumb it can be brought back.

A pile that is not perpendicular when it is in proper position, unless meant to batter, should be drawn and redriven.

Finishing: — When the piles are in place, a screw-cap should be put on, or a plate and angle cap rivetted on with lugs for bolting beams, girders and sway-bracing to. The inside of the pile should be filled with rich cement-concrete, deposited in such a manner as to prevent the contained water from washing the cement away from the sand and broken stone. The cement filling should be thoroughly rammed, when it will adhere tightly to the uncoated iron inside, and probably prevent rust. The outer surface should be painted as soon as the pipe leaves the shop with three coats of linseed oil and red lead paint (Chapter XI, Section VI), and should be painted again, so far as possible, just before the works are completed.

Spacing: — Will usually be determined by the required size of the flanges and the requirements of the works. Usually, the wider apart they can be placed the better up to a point when the spacing of the piles in a bent equals distance from extreme high water to bottom of water, or equals length of end from soil to cap.

Whenever a pile whose length from soil to cap exceeds ten diameters is likely to be subjected to shocks such as drift-wood, logs, floating ice or wave-action, it should be braced strongly with diagonal bracing to the piles nearest it, and the bracing raised sufficiently to be clear of all obstructions.

The disc should be made of cast-iron. The shaft should be of steel or wrought-iron.

Loading: — Safe bearing-value of screw and disc piles when the screw or disc goes at least 10′ below the lowest point of scour in the water, or the same depth below the surface of the ground elsewhere, may be taken at double that given in Table XXIX, provided the pile is in sand or the load is very slowly applied and the disc should be so proportioned

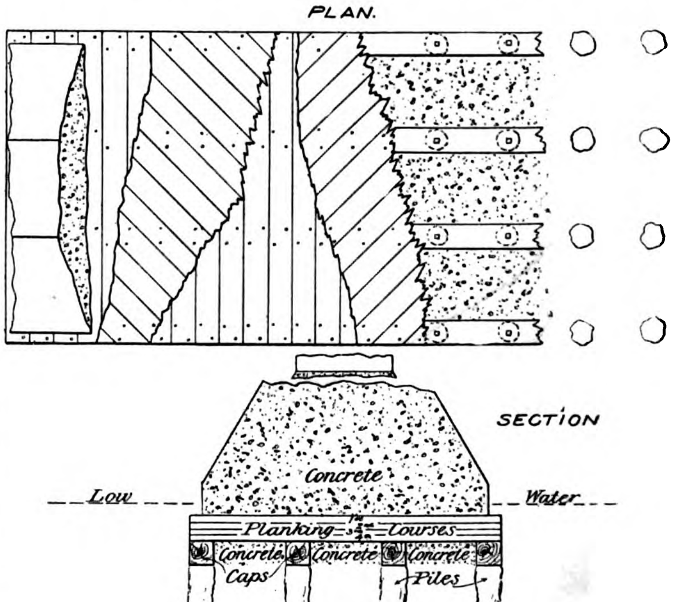


Fig. 98.

that its bearing surface equals the area of a circle whose diameter is the maximum diameter of the disc. The depth should be such that there will always be at least 10′ of undisturbed material above the disc. The cylindrical part of all piles should be computed as a column of length = free length

of pile (See Chapter IV), and in addition, provision made to resist any transverse strains, should that be necessary.

§ 275. Metal Sheet-Piles: — Should be driven with a light pile-driving hammer, a heavy sledge or a "tup," with the heads protected. Sheet-piles should be of cast-iron proportioned to resist the moment of the earth thrust as per Formula 54, § 258.

If near the footings of a building, add to this moment that due to a uniformly distributed load over the free height $= \frac{1}{2}$ load of wall of building and floors, and proportion as cast-iron lintel, § 197, Chapter III, Table VIII.

Sheet-piles should be secured at top by bolting to an I-beam or by slipping an I-beam into heads formed to receive it, and at the foot should be similarly secured against coming in, by using an I-beam properly braced (Fig. 95).

The load on the I-beam breast-pieces will be the reaction from the sheet-piles. (See § 258).

§ 276. Wooden Sheet-Piles: *Use:* — Generally of a temporary character although sometimes meant to be permanent. Permanent uses have been indicated. Temporary uses are principally to exclude the earth from an excavation when from any reason it is impracticable to let it take a natural slope. Occasionally two courses of sheet-piles two or more feet apart are driven, and the space between filled with a clay puddle to make a coffer-dam. Make either of plain plank, tongued-and-grooved plank or of three planks with the centre one advanced beyond the others, forming a tongue on one side and a groove on the other and known as the Wakefield sheet-pile.

Use tongue-and-groove sheet-piles when a moderate amount of water is to be excluded and the Wakefield when it is desired to have the sheeting as tight as possible.

Driving: — For whatever purpose, the penetration of the pile usually fixes the general method.

If to hold moderately firm or dry earth back during excavation when plenty of room is available, or when the depth exceeds 10′ 0″ then the piles should be used of length sufficient to reach to $\frac{1}{2}$ the depth or in 12′ 0″ lengths. The breast-piece *a* (Fig. 96), is put in and braced in position, the sheet-piles are given a sloping chisel point and driven with a "tup" or "maul" or a light frame hung from the end of the boom of a boom derrick ("*Engineering Record*" Vol. 25, Page 281). As fast as the pile penetrates, the earth is removed until the pile shows signs of coming in, then the breast-piece is put in, braced, and worked down until the excavation reaches a point 2′ 0″ above the point of the piles.

Then a new breast-piece *c* is put in and braced, and the distance between *b* and *c* secured by means of wedges which are knocked out as the piles are driven. The driving of the lower course is similar to that of the first, the men who do the driving passing along, driving each pile down a little at a time, and keeping them nearly uniform in depth. If desired the breast-piece *b* can be omitted, *a* being wedged off the proper distance with wedges behind each sheet-pile.

Piles should be 2″ × 10″ hemlock or spruce, straight grained and sound, and should have a breast-piece for each six feet of height in the clear, that is, the maximum distance on centres between *a* and *b* or *b* and *c* should be 6′ 0″. Breast-piece should be 10″ × 10″ with a brace each 8′ 0″ of length.

To hold soft earth, mud or silt, they should go an increasingly greater distance down as the material gets softer, up to about 10′ 0″ below the bottom of the pit. This depth should be attained before the excavation is started, and when started, it should be so prosecuted as to expose only a small portion at a time, say 200 square feet, which should be immediately partially loaded, otherwise the pressure on outside may cause the material to flow in.

Driving is much facilitated in sand, clay or gravel by the use of the water-jet,

An 800-pound driver can also often be used to advantage when the piles are meant to be permanent, but then creosoted North Carolina pine or Canadian spruce should be used, and the breast-pieces are made lighter, are secured to round piles and are called wales (Fig. 97).

The piles should be so placed as to be brought against the cap and lower wale by the outside pressure. Cap is 10″ × 10″ or 12″ × 12″, or 3″ × 10″, or 4″ × 12″ in pairs, held to pile by means of oak tree-nails roughly squared $1\frac{1}{2}$″ × 30″ long, and driven into a $1\frac{1}{2}$″ round hole 30″ deep, or the head of the pile is notched 3″ or 4″ on each side, leaving a tenon at least 6″ thick and the cap put on in pairs and bolted through each pile head with 1″ bolts, using 4″ washers.

After the piles are driven, the outer wale is put on and bolted through the caps with $\frac{3}{4}$″ iron bolts and 4″ washers, bolts spaced 3′ 0″, *c* to *c*, and yellow-pine shims put between the two parts of the cap.

Often it will be necessary to put in temporary struts until the footings are up and back filled to prevent the sheet-pile from being pushed into the pit.

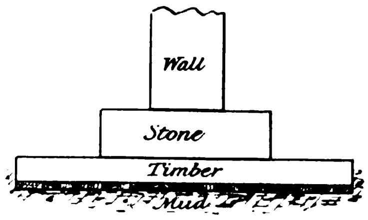


Fig. 99.

Finishing: — If the sheet-piles are to be left, the top edge should be cut true with a saw and a plank cover 2″ thick, and full width of piles, cap and wale, spiked on to exclude rain as far as possible.

The works should never be painted.

Loading: — The moment effect of pressure on the piles, when desired, can be obtained by Formula 55 and the piles proportioned to resist it to by using the formula of Chapter III.

Drawing: — Use a pair of claws with a chain passing through the eyes, and the ends connected in a ring in which a lever is inserted, or a simple heavy chain with two rings.

§ 277. Cribs: *Material:* — When of metal, see § 267. When of wood, which is the usual material, use yellow pine or spruce, treated.

Methods: Over-piling: — After the piles are cut, cap with 12″ × 12″ timber, placed longitudinally and tree-nailed to piles, then fill space between caps with concrete to level of caps. When the caps are 4′ 0″, *c* to *c*, or less, connect all caps with four courses of 2″ × 12″, two courses making an angle of 45° with the caps and two courses at right angles to them. Each course spiked at each intersection and at the ends with 5″ boat spikes. Above 4′ 0″, for each added two feet of distance, *c* to *c*, add one inch to the thickness of the courses. The footings courses should come to within 1′ 0″ of the outer edge of the outer row of piling in every case (Fig. 98).

Alone: — Lay one course of 2″ × 12″ in the bottom of the trench and longitudinally as close together and as nearly level as possible. Then transverse timbers of the size necessary to support the load (Fig. 99).

Calculate size of beam considering it uniformly loaded with B and of length y, fixed at one end (Fig. 72). If this requires a size larger than 12″ × 16″, it may be made up of two pieces, each 12″ wide, and $\frac{1}{2}$ the requisite thickness bolted together with $\frac{3}{4}$″ bolts spaced 6″ on centres, staggered both ways.

It is better, however, whenever a larger size than 12″ × 12″ is required, to lay a bed of concrete and use steel beams as heretofore described.

§ 278. Soft Soils: *Quicksand, Mud, Silt:* — Can often be held in position to start work on, by laying two courses of $1\frac{1}{4}$″ x 10″ boards, crossing each other at right angles, and laid diagonally in the trench, and often this is less expensive than drying the material by using a fill of sand. On such a flooring, the concrete may be laid and loaded so as to secure an initial settlement before commencing the footing.

§ 279. Sand and Gravel Fills: — Whenever the soil is a soft wet clay that cannot be drained, and that lies practically horizontally, and piling cannot be used, good results can be obtained by sheet-piling around the entire area intended to be covered by the works, and 10′ 0″ beyond the footings and then filling with sand and gravel 5′ 0″ to 10′ 0″ deep in layers 1′ 0″ at a time, and thoroughly wetting each layer.

Mud and silt may also be treated in this manner, when piling is impracticable, and if the spread beyond the footings is made four times the depth of the fill, the sheet-piling may be omitted entirely.

Sand Piles: — Piles are occasionally driven into soft earth or wet clay, then withdrawn and the holes filled with sand, well rammed, and the footings started on them. They may be considered as an engineering curiosity and are not recommended.

SECTION V. — CAISSONS:

§ 280. Description: — Are essentially boxes of wrought-iron either circular or rectangular in plan with a closed top in

which is inserted a small cylinder with air-tight doors so arranged as to be alternately open to the outer air and to the caisson. The caisson is sunk by admitting men into the space beneath the closed top to excavate the material from under the edge of the caisson, thus permitting it to sink. As the sinking progresses, water is excluded by keeping the pressure of the air on the inside of the caisson sufficient to keep out the water. The air-pressure is used to remove the material after the manner of an ejector carrying mingled air and mud through a pipe to the surface.

The caisson is carried down by building masonry above, sufficiently heavy to overcome the resistance of the soil until a sufficiently strong bearing stratum is reached, then the voids underneath top of the caisson and between the cutting-edges are properly filled with concrete.

§ 281. When Used: — Where the soil consists of a tough stratum overlying mud too deep to pile into, and where the initial loads are such that it is impossible to so distribute them as to keep them within safe limits, even when distributed over the entire area of the lot, the caissons may be used; but ordinarily they are not to be recommended, involving as they do considerable expense and great loss of time with an element of uncertainty.

Where the soil is homogeneous, it can almost always be relied upon for the foundations.

[To be continued.]

THE *GAZETTE DES BEAUX-ARTS* AND THE WORLD'S FAIR.

FOR the last few months, says M. Jacques Hermant in the *Gazette des Beaux-Arts*, the World's Fair at Chicago has opened its doors and invited the whole universe to a festival, which it was hoped would be the most marvellous of all those to which the world had hitherto been invited. Have the hopes been realized which it gave birth to, and procured for all those who have been tempted thither the satisfaction which they expected? It is difficult to say. The beginnings were laborious, surrounded by obstacles of every kind, due especially to a lack of method and experience on the part of the organizers, who were mere novices in the matter, and altogether too much convinced of their own infallibility. But it seems now that it is in the way of achieving more of a success than was expected, and one which must assure for it an important place amongst the curious and hardy undertakings of our century, so fecund in great enterprises. It deserves, then, better treatment than the rather unflattering articles of certain talented writers who have up to now taken the trouble to visit the Fair. By dint of smiles and sneers they have succeeded in creating in the minds of Frenchmen, so prompt to admit ready-made opinions, the idea that the famous World's Fair was only a colossal *fumisterie* hatched in the brain of certain Barnums, who sought to attract the notice of the world to the "phenomenal city." But if this impression is the one which was drawn from the beginnings of the Exhibition, from the Homeric struggles between the great cities of the North, from an advertising so exaggerated that in our eyes it reaches the farthest limit of the ridiculous, it is superbly ridiculous to be halted at this anecdotic and superficial stage and only cast in passing a smile at so colossal an accomplishment. Such an assemblage of works, if it does not make the exhibition at Chicago the equal of ours, none the less constitutes it an imposing manifestation of the efforts that America is making to raise herself to the rank of other artistic countries, and achieve for herself a reputation which the older Europe has denied to her. Are we not a little like those people who for an instant have been afraid, and who in the joy of extricating themselves from their false position, have only sarcasms for those who have not known in turn how to conquer their difficulties. Would it not be more intelligent seriously to study this enterprising unknown, who has just begun a struggle with us in the realms of art, and who seeks to show us in what fashion she has begun to handle the arms which we ourselves have furnished her?

When the organizers of the Exhibition, passing from the first studies to practical matters occupied themselves with the formulation of the final scheme of execution, they had an idea which appears singular to us, but very explicable in a country where decentralization is pushed to its farthest limits. After having fixed upon certain general, certain grand lines, not very well defined, but only intended to fix approximately the places which they judged proper to give to the principal buildings, distributed without order and without much method in the midst of the marshes of Jackson Park, they summoned the principal architects of the leading cities of the United States, and assigning to each a building directed them to work out their own schemes. A price having been agreed upon for the positive execution of the desired designs, the architects separated, some going to New York, others to Boston, Washington and elsewhere, and all set about studying their schemes without any other point of contact between them than the central service established at Chicago. The projects were made, brought to Chicago by their authors, subjected to certain minor changes, and execution was begun. Could there result from this one of those magnificent *ensembles* which leave the visitor under the powerful impression caused by a fair ordonnance whose general lines have been wisely considered? Evidently not. The difficulties which, perforce, resulted from the method adopted, perhaps also certain sage advice, quickly disclosed to the authorities the fault which they had committed. So they hastened to change their scheme by appointing an architect-in-chief to have general control of all construction. Unfortunately, this time inexperience was betrayed into adopting a measure which rendered the remedy worse perhaps than the disease. Since they had an architect and his staff, why did they not charge them not merely with the oversight but with the absolute execution of the works? The projects were there, but their authors were not there. Well, what prevented the chief-of-construction having entire control of the execution? From time to time the real authors might come and cast their eye over the work, and everything might progress as well as could be desired under a direction in this way become absolutely single. And it was perhaps upon the day when this decision was reached that the gravest fault was committed. If at the moment of conception unity of view is indispensable it is precisely at the moment when one comes to the detail of execution that division becomes necessary. A single man found himself charged with the execution of a score of palaces, commanding an army of inspectors and designers recruited from nascent schools from amongst any who were capable of holding a pencil, young men for the most part without experience, still ignorant of the complications of a profession abounding in ambushes and leaving perforce to chance the duty of solving difficulties which they were fitted neither to foresee nor to avoid. From this arises the startling commonplaceness of the details and those faults of proportion between different parts of one ordonnance which make the European, trained through long years to respect form in its purity, elegance and chastity, grind his teeth.

The buildings of the World's Fair, then, are not in general works seriously and really desirable so far as their details are concerned, but rather large sketches, without pretence, and carried into execution by not very skilful workmen. One should confront them, then, only from a very general point-of-view, just as one judges a sketch by trying to discover what were the artist's intentions. To tell the truth, these intentions are rare enough, and we believe that we have discovered the reason. To make different buildings to shelter the products of mines, electricity, mechanic arts, the industrial arts, the liberal arts, or those of agriculture, is to do nothing more nor less than to build vast sheds, surrounded and masked by façades more or less decorative in character. It is only by the ability shown in the arrangement, in the infinite science of detail, that one can succeed in varying the effects and give to each an individual character. Now this ability and this science are still wanting in America, too young in everything which concerns architecture to have acquired them. Those of the buildings of which we speak are of a disquieting commonplaceness. When, on the contrary, the elements of decoration present themselves to the mind in a more precise fashion; when there is no need to torture the imagination to discover effects which result naturally from the very subject of the composition, we behold the artist reveal himself, and show that he knows how to derive an ingenious *parti*, and produce an interesting work, as is the case with the Fisheries Building or the Transportation Building. There are, then, in America certain artistic natures which prosecute their researches successfully. They are still novices, but they are interesting and to be studied.

To thoroughly understand them, we must not stop amid the too hasty structures of the World's Fair. They must be sought for in the cities, where they have produced more serious works, responding more directly to the needs and usages of the country. A study of this nature will certainly be the source of more interesting reflections than a close and detailed description of the numberless buildings at Jackson Park.

In spite of the World's Fair, in spite of its unheard-of magnitude, in spite of the traces of a considerable German element, Chicago is and remains at present, so great is the power of absorption of the American people, a business city, where the search for money shows itself under all forms. It takes possession of the brain to the point of deforming almost all those who might be disposed to manifest tendencies for research and study, and reduces the artists themselves, who have come to establish themselves there, to mere artisans, who sell their merchandise, who set up offices of forty or more draughtsmen, and, whenever Lake Michigan becomes too inclement, can set off to breathe the warm air of the Mexican Gulf, while their "plan-factory" brings them in their millions [francs].

Now, if it is true that the architecture of a country may be at all epochs the most direct reflection of its customs and needs; if the immutable law of constant concordance between the genius of a people and the character of the monuments they produce has need of new confirmation, one could not find a more brilliant and more absolute one than in the constructions which to so great a degree astonish Europeans on their arrival in Chicago.

In a city where the observance of the arts is completely ignored, where the inhabitants (whom a narrow religious education hinders

from manifesting their joys and taking their pleasures openly) consider that loafing or getting enjoyment is losing precious time, where for every one the very end and aim of life is the gaining of much money — and when one has gained much of it, to make use of it to gain still more — what must the art of architecture produce? Utilitarian buildings. Where necessarily must one go to find a characteristic effort? To the buildings destined to shelter and facilitate labor. Just as there remains to us from ancient architecture, the temples, basilicas, the baths and the circuses, corresponding to the principal needs of existence with the people of Greece and Italy; just as, later, we see the church, the feudal castle and the town-hall, symbolizing the three grand elements of the Middle Ages, religion, feudalism and the communes; just as we find in the great imperial and royal châteaux the expression of the overwhelming power of absolute monarchy, so we must find perforce in the productions of the most American of all cities buildings of a very individual character, bearing an expression acquired from the need of labor, which is the very essence of the American genius. All these constructions can be reduced to a general type — the "Building," *par excellence*, with its inevitable accessories the post-office box, the telegraph and telephone office and the messenger-station. This is the palace, the temple of labor, in which everything is conceived, combined and studied in a fashion to render *work* easy, agreeable and as little fatiguing as possible. To comprehend this conception, which is quite peculiar to the American people, at once practical, original and very characteristic, it is necessary to know something of the manner of living and working of every American, when he is not travelling. He makes of life two distinct portions, one of which belongs to the family, the other to his work, and these two portions have in general no points of contact between them. The family and the home are most often far from the centre of the city in some north or south quarter exclusively occupied by private habitations and connected to the heart of the city by electric or steam tramways, elevated railroads or simply by a steam railway at the end of an immense straight avenue, whose length reaches twenty-five or thirty kilometres. There each one has his house, from the humble wooden structure built on piles, with a little flight of stairs, with a few steps for the approach, which still preserves in its uncertain stability the somewhat savage air of a pioneer's hovel, and makes one think of the houses on wheels which our European nomads drive over our roadways — from these to the suberb palaces of these kings of the "mighty dollar," which contend with one another in might and massiveness. Labor, on the other hand, is never lodged near enough to the centre of things, never close enough within reach of everything which modern science puts at one's disposal for facilitating affairs and the transaction of business. The contact between varied interests is never close enough. If it were possible to realize some gigantic conception, uniting in one single building all businesses of every kind, one would certainly then satisfy the idea of the American. While waiting for the construction of this Tower of Babel of a new kind, the present realization is curious enough. In the centre of the city rise by scores immense structures, sixteen, eighteen, twenty and even twenty-two stories high, whose enormous square masses dominate by almost their whole height the rest of the city. Like donjon-keeps, they loom strongly out of the mist of gray smoke which envelops them and gives to them the distinct resemblance to the fortresses of another age. Externally, the aspect is generally the same — a high basement, including a ground-floor, a first story of a strong and squatty architecture, most often inspired by the Romanesque or Byzantine style. An immense full-centred arch, whose springing is very near the ground, and is supported by enormous columns of granite, serves as entrance. Upon this basement is reared a great vertical portion engulfing in one single motive ten or twelve stories, and even more. Most often it is a series of broad brick piers, bound at the upper part by full-centred arches, also of brick, and forming thus an infinitely high and narrow arcade, regularly divided into as many equal parts as there are stories, with one window in two or three divisions per story. All these windows and each bay through the whole height are similar — not merely similar, they are identical, and suggest very clearly the appearance of a hive, from which each cell has an outlook on the outside.

Above this arcading is a frieze consisting of a row of small bays — often treated in the spirit of those delicious galleries which terminate the Florentine and Pisan towers — and to crown the whole, by way of a cornice, a strong, mighty slab of great projection, which, by its mass and importance, gives to the whole an air of grandeur, robustness and simplicity which is truly impressive. These edifices are extremely curious, for they are in the frankest way original, and built with that evident preoccupation to do only that which is necessary to create the impression of majestic force and calm which their great height requires. Everything, even their decoration borrowed from primitive styles, contributes to make of them a real creation of a new people, primitive in matters of art, unconscious of their own force, who as yet still toddle, and only know what others have taught them. Wait half a century, perhaps a whole one, and the American who wishes to owe nothing except to himself will surely by that time have succeeded in divining the formula. On that day, Europeans, all astonished, will, perhaps, be obliged to go and search beyond the Atlantic for that new expression answering to new needs which we all seek after with so much passion, and to which we do not attain, fossilized as we are in the traditions of the School.

THE GREAT EXHIBITION REVIEWED.[1] — II.

AS AN ARCHITECTURAL SYMPOSIUM.

THE Exhibition is not great alone as a spectacle, nor is this spectacle thus presented in any way derogatory to its main purpose. This part and a large part of the educational features of the programme are such as have never before been carried out to an extent in any previous undertaking. It has been an essential such factor in furnishing an attraction that has brought greater masses together than would otherwise have given it their patronage and has thus contributed to a financial success which is now assured. The spectacle presented by the main grounds is in every way dignified. The Midway which is mainly an amusement feature is fortunately an arm of the park, and not an integral part of it, and hence can in no way mar the general effect.

In making the exterior of the exhibition spectacular, an opportunity has been given for an architectural symposium, especially appropriate to an International Exhibition, and such as the world has never before witnessed. The possibility of presenting the forms of dignified and highly elaborated architecture and sculpture, in inexpensive materials has been availed of to the utmost. This was at first thought to be of doubtful expediency. As the work was cheap, cheap and tawdry effects were feared. Now that there has arisen a popular clamor that the buildings be retained for some time as works of art, it is evident that few realize their unsubstantial character. It is little appreciated that they are all carefully watched and kept in constant repair lest the illusion be dispelled before the rapidly approaching last day of October. The dropping-off of a few pieces of the staff covering from either of these structures would soon betray their fictitious character. But this only explains how well they have fulfilled their purpose, and why so much has been built with the means at the disposal of the construction department. The popular verdict based on a supposition that these buildings might stand for years, has set at rest all anticipation of a possible failure in the architectural effects, or the methods of construction that have been employed.

From a critical standpoint those buildings which are constructed with wooden frames covered with staff, are only full-sized models from architectural designs executed with every possible illusory effect, and associated with each other with their surroundings and landscape effects as they would be if permanently erected. In doing this it has been found that cast staff, which is nothing but plaster-of-Paris permeated with hemp, when made of the plaster that is manufactured in Michigan bears a remarkable resemblance to marble. But where plain surfaces of the exteriors have been plastered on lathing of any kind, not only is such a resemblance almost unattainable, but the surfaces are not straight and the plastering is liable to drop off unless it is done with very expensive materials. It has also been found that buildings can be covered more expeditiously with blocks of staff one inch thick, than with lath and plaster, and that such work can be carried on in the coldest as well as in rainy weather, while it is vastly more enduring as far as time is concerned, and can be preserved indefinitely by the use of good oil paint.

White marble would have been the appropriate material for those buildings which compose the Grand Court. It is, therefore, fortunate that they were cast in staff and proper that the colors which various kinds of nearly white marble assume should have been preserved in the subsequent treatment. As a result the correct expression of the design is as nearly perfect as possible. To the ordinary observer they are real buildings and the illusion is perfect; and it requires but a small stretch of imagination for even the initiated eye to see them in the same light.

There are two grand perspective effects in the Grand Court, one from the east and one from the west. That from the east has the Administration Building for its objective-point with the fountains in front of it. That from the west has the Statue of the Republic for its objective-point and the Peristyle arch for its background. In these perspectives the buildings on each side are in perfect harmony with each other and the whole Court. Fortunately their uniform cornice-lines are not high, yet those accustomed to high buildings do not complain that they are low. We are so far removed from the irregular perspectives and generally ugly sky-scrapers of the great city as to almost forget their very existence as a disturbing element. Even the end of the great Manufactures Building on the north side does not dominate the court, for it is only the end that enters into the composition. The great height of its roof and the irregular heights of the roofs of the other buildings composing the Court, are not evident in the general views. The Administration Building alone dominates the general design. It was intended that it should. It is hard to realize that these buildings are the works of different architects, all men of national reputation. Nothing but the admirable plan devised by Mr. Burnham of bringing together leading members of the profession to act in coöperation, and yet independently as to design and details, could have produced this result in so short a time.

In selecting Richard M. Hunt for the most prominent work, he did honor to one whose name is more intimately associated with the advancement of the profession in America than any other. He has alike been honored not only by the praise bestowed upon this work

[1] Continued from No. 928, page 8.

by his fellow-practitioners, but by the recent award of the Royal Gold Medal of the Royal Institute of British Architects. From the time that he was selected, he seems to have been inspired with a full sense of the responsible nature of his task. This design must have been at once conceived as a whole, and is not the labored result of repeated studies, for the executed building does not differ materially from the original sketch.

Before referring to it in greater detail, a few facts from the architectural history of the Grand Court and the Exposition may bring into stronger light the success of the great achievement. Neither the Grand Court nor the whole plan of the Park was the result of a simple comprehensive plan, as some may have supposed who have testified to its completeness and the absence of blunders. No one man and no body of men could have conceived all its varied features, and recorded them on paper before executing any of the work, and have time enough left to make the improvements and erect the buildings before October, 1892. It was absolutely necessary to begin the work on a tentative and elastic plan, which was modified and enlarged from time to time until the whole ground was covered. No general plan of landscape or building work was adopted until after the death of the lamented Mr. Root. The numerous sketch-plans of grounds and buildings made by him before the Council of Architects was appointed were of the greatest value in enabling the Directors to realize the extent and varied nature of the work they were expected to do. These now hang in the office of the Director-of-Works, silent witnesses of the enormous labor performed in such a brief time by this master-mind; but they in no respect show anything that has since been accomplished, except that there should be a grand basin of water, similar to that of the Paris Exposition of 1889, around which the principal buildings should be grouped. Where this basin should be, and how treated, was as yet undetermined. The Council of Architects, with Mr. Burnham acting as moderator, fixed the position of the longitudinal axis of the Grand Basin and its dimensions, and decided that this should be the starting-point of all the improvements in every direction. They also decided on the width of the Court, but not its length, and located four main buildings, two on each side, and the Administration Building on the axis of the basin and to the west of it. This action was approved by the Directors in the latter part of January, 1891, and the architects separated to make their designs. When they were ready — and they were only preliminary studies — they assembled again and compared notes. Their proceedings are set forth in brief in Mr. Burnham's paper before the International Congress of Architects, and the full history of the conception and execution of the work will be given in his coming official report. This was the meeting in which they realized the value of concerted action and co-operation, as well as friendly rivalry, in which nothing but reputation was at stake. They could begin to see their work in its unity. Each design was subjected to friendly criticism. Defects were seen and corrected, and the general plan came up again for consideration. This resulted in changing the position of one building, turning it around so that its end faced the Court, and thus making room for another building facing the Court. It opened another of those grand vistas for which this exhibition is so celebrated, and of which so little has been said. (It is the view of the Administration Building from the lagoon bridge to the north, where it is seen almost in elevation, at the end of a perspective formed by the Electricity and Mines Building.) This action brought the work of Mr. Beman upon the Grand Court, and provided definitely for six main buildings.

Meanwhile, after the first meeting of the Council, Olmsted & Codman had been determining the boundaries of the lagoon and the Wooded Island, so that the engineers could begin their work, and had laid out the canal (so called) which crosses the Grand Basin at the western extremity, and connects it with the lagoon to the north, the lagoon being connected again with the North Pond, which already formed one of the permanent improvements of Jackson Park. Thus the whole water-plan of the grounds, excepting what was afterwards designed as the "South Pond," including two inlets from the Lake, was determined upon, and the way made clear for obtaining sites for four more buildings which it had been decided to build, and the Woman's Building, for which a location was needed. Three of these buildings were the Transportation, Horticulture and Fisheries. The fourth was the Venetian Casino and Tower, which it had been decided to construct on piling in the Lake, connected with the Grand Court by a pier, and the work had been assigned to Francis M. Whitehouse.

Nothing had yet been done about the Fine Arts Building, which it was then thought would be built down-town, on the Lake Front Park, together with the Music-hall. It was the fond hope of his friends that the design for the former by John W. Root, which had been completed in pencil from his own hands, and was the last work he ever did, would be carried out.

Thus the second meeting resulted in the location of all the largest exhibition buildings, except that of the Fine Arts, and left both ends of the Grand Court open, though it was thought at the time that the Administration Building would form a fitting termination to the west end of the Court. This it would not have done. But it was, fortunately, placed so that its north and south axis came between the Electricity and Mines Buildings, resulting in the vista that has been referred to. The Mines Building extended somewhat to the west of it, and the necessity for increased room in Machinery Hall resulted in extending its façade, in a modified form, farther west. The intention was to have a one-story railroad station to the west of the Administration Building, and a system of circular tracks to the west of this for delivering passengers directly into the grounds. These would have taken up more room than the system of stub-end tracks that was afterwards adopted. When at last the whole system of railways entering the Park was changed — which was a year after the time we are speaking of — an opportunity was given for closing the west end of the Grand Court with a monumental building, which left the Administration Building near the centre of a plaza, where it can be seen from every point-of-view. This building, the Terminal Station, unfortunately but little used yet doing a most important part in completing the perspective of the Grand Court, is the work of Charles B. Atwood.

The east end of the court, through which was a clear view of Lake Michigan, was the subject of serious discussion by the Council of Architects, and it was a long time before its ultimate treatment was decided upon. All that remains of the original design is the colossal gilded "Statue of the Republic," by French. It was the most difficult problem to handle of all that were encountered, and the only one which there was any delay in coming to a unanimous conclusion. It is not to be wondered at, therefore, if it should not be above criticism.

Nearly all the published bird's-eye views of Jackson Park show the original design prepared by A. St. Gaudens, the Director-of-Sculpture. It provided in a semicircle for thirteen independent columns supporting statues. Between these there would have been an almost unobstructed view of the Lake from every part of the Court. Beyond them would have been a view of the Venetian Casino and Tower rising from the water, and the whole effect would have been much more Venetian than it now is. In fact, the inspiration must have come from the Piazetta of Venice, with its historic columns and the distant view of the islands of the lagoon. Lake Michigan seems to have impressed this body of artists as having a Venetian placidity such as the average Chicagoan cannot appreciate at all seasons of the year. To those living on the spot, it is more noted for its terrors than its pleasures, except as a beautiful thing to look at, and it is a wonder that Mr. Burnham so long entertained the idea that the Lake could be converted into a lagoon. Subsequent events, one of which was the filling-up of the lagoon, as far as built, with sand during the first winter, demonstrated that a much larger pier would be required for the landing of boats, and that the Casino was needed on dry land, or, at least, where it would be better protected from storms. A moderate-sized music-hall was needed — or it was then thought that it was needed. There were two excellent sites for these — one east of the Agricultural Building, the other east of the Manufactures Building — even though they might have to be built on piles driven through the water of the Lake and protected by stone-filled bulk-heads. It was a simple matter to connect these by a colonnade and entablature. The centre of this was the proper place for the "Columbus Arch," being the nearest point to the inland sea, which could at times give the suggestion of ocean, for no land is in view from its shores at this point. Thus far no architectural tribute to Columbus had yet been offered, except the proposal to erect a fac-simile of the old convent of La Rabida on the rock-bound eminence to the south, as was done later.

These suggestions first came from Charles B. Atwood. They were adopted. The Roman-Corinthian order of the Casino and Music-hall carried across the end of the Court with the Columbus Arch, surmounted by the "Columbus Quadriga," in the centre are his designs. The two buildings especially were necessary to complete the architectural perspective of that end of the Grand Court. The arch, which should some time be perpetuated in permanent materials, is his greatest work. It would be very appropriate after all the great buildings on the Court have become only a memory, that this arch should stand and be kept in repair until the time comes when it may be replaced in enduring stone. The statue of Columbus, by St. Gaudens, which now stands in front of the east entrance to the Administration Building could then be moved to the centre of the bridge which is now under the arch and connects the two sides of the Peristyle.

There is no question as to the magnificent effectiveness of the Peristyle as seen from the lake, nor is it architecturally any less effective when seen from the Court. It is the connecting link that was needed and an admirable background for the Republic Statue. But it certainly obscures the view of Lake Michigan to such an extent that it looks as if it were put there for that purpose, and it is a question whether or not the spaces on each side of the arch should not have been more open, and treated like the great arches of Mr. Atwood's Terminal Station, rather than repeating the peristyle effect which had already been given in the Machinery Building and the South Colonnade.

It is natural that when it was decided on account of the want of filling material, to treat the World's Fair site as a system of lagoons with sloping shores and canals bordered with terraces upon which the buildings were to be erected, that a resemblance to Venice should have been suggested. This was so, to a certain extent. But as the designs of buildings began to be developed and the work began to take on a more Classic form, far removed from Venetian picturesqueness, the Venetian idea became less prominent in the

work, and it became more and more evident that a creation of such grandeur needed no prototypes. Destiny seems to have decided that it should develop its own originality. So there is nothing of Venetian feeling left except a suggestion on the Rostral Columns that decorate the terraces of the basin. There is not a building on the main grounds that can be called Venetian in style, and the building of the Venice-Murano Glass Co. in the Midway is little more than a travesty on it. There is more approach to a Venetian effect where there is no water. The plaza around the Administration Building somewhat suggests the Piazza di San Marco. But here the point of attraction is the great building in the centre, while there it is St. Mark's at one end. The suggestion rather comes from the fact that most of the buildings on the plaza have loggie on the ground-level.

The flag-staffs rising from the ground with their beautiful decorated bases heighten the effect wonderfully, and the band-stands and chocolate pavilions which were thought to be intruders tend by contrast to greatly magnify the Administration Building. It not only towers above all its surroundings, but like few other buildings that have been erected can be almost said to tower above criticism. It is the apothesis of Classic and Renaissance architecture by one of the great living masters. It dominates and is the keynote to the Grand Court as a whole. It cannot be appreciated in all its beauty and grandeur except in connection with the surrounding structures. It is the keynote of the Grand Court. Without it there would be no Grand Court. Without St. Mark's the piazza would be a series of ordinary buildings with no apparent connecting link. The sculpture by Carl Bitter was all inspired by Mr. Hunt. Suggestions of every group were on his original sketch, and it is as much a part of the design as the hands and head are part of the human body. The groups do not dwarf the building by their colossal size. The cornices of the four corner pavilions are on a level with those of the buildings surrounding the Court. All below this point is but a base to carry the main design. The four-story pavilions serve only as buttresses to support the central mass of the design, and the subdivision of their double arches into many small windows only serves to give scale to the superstructure. The great octagonal dome, designed on lines more nearly approaching those of Florence's great cathedral than any other, does not need a lantern or central ornament to give it height. In this it is like no other of all the domes of the White City.

The peculiar feature of the Grand Court in which it differs so much from anything heretofore seen is the double terracing of the ground on each side, affording walks on two levels and two lines of Classic balustrades, the pedestals of which are not surmounted by sculpture of animal forms. The credit of this part of the design is due to the late Henry Codman, partner of Mr. Olmsted. An unusual effect is produced when the Court is crowded with people, somewhat like that sought in American theatres, wherever a good system of seating demands that the audience may be able to see itself. For, looking across the Court on a crowded day one can see twice as many people as would otherwise be the case. Nothing gives the Court greater apparent size than a mass of people, who give proper scale to every object within it.

Such is the architectural symposium of the Grand Court, or Court of Honor. But it is little more than half of the canal system, to say nothing of the lagoons. The South Canal which intersects it, is no less attractive in its spectacular and architectural effects. At the south it is closed by the Colonnade which screens the wall of the Stock Pavilion. This colonnade is a continuation of the details of the Machinery Building, and from the north appears to connect it with the Agricultural Building.

The double terraces continue the whole length of the South Court. At the south end the lower terrace spreads out in a circle and serves as a foundation for the Exposition Monument. Probably in all accounts that have been written of the exhibition as little has been said of this as of any of its prominent features. Around the base of the monument are five concrete steps, which though little frequented offer a grateful resting-place to the weary sightseers. From this point, as we turn our backs to the Colonnade, opens up the grandest perspective revealed by this wonderful achievement of all the arts. We can find no fitter resting-place than this. P. B. WIGHT.

BRITISH LABOR STATISTICS.

"STRIKES and Lockouts" is the subject of the most recent Blue-book on labor issued by the British Government, and in it the wide topic of trades-unionism and labor-agitations generally throughout the kingdom are also fully treated, because, the compiler says, it is impossible to thoroughly understand the history of a strike without a knowledge of the larger movement going on outside of its immediate locality and trade. The book was presented to Parliament by the Board of Trade some weeks ago. Its facts are supposed to relate specifically to the year 1891, but in many matters they are up to date of the end of 1892.

A comparison of statistics as to the unemployed in various trades for a number of years past shows the present existence of a greatly depressed condition of the labor-market throughout the kingdom. It began in the latter part of 1890, and had grown steadily worse down to the close of 1892, when the statistics were closed. The experts reached the conclusion that trade will continue to fall away until the end of 1893. In 1890 the average percentage of unemployed was 2.02, in 1891 it was 3.39, and last year it rose to 5.25. During 1890 there were many strikes for an advance of wages. In 1891 there were very few such, but a great many in resistance of reductions in wages, showing the declining condition of trade. There were 893 strikes during 1891, affecting 4,507 business concerns, and 13 lockouts, affecting 48 concerns. More than one-fifth of the strikes were connected with the textile industries, nearly 15 per cent with mines and 16 per cent with the building trades. More than half the strikes were because of disputes as to wages, and nearly one-third on account of demands for increased wages. While 45 per cent of the strikes over wages were successful, and one-fourth more partially so, the number of persons engaged in the unsuccessful strikes was very much larger than in the successful ones. Twenty-three strikes were over demands for fewer hours of labor, and most of them were more or less successful. There were forty-seven strikes against the employment of non-union labor, and one-half, comprising by far the larger proportion of individual participants, were entire failures. Thirty-one strikes were of curious origin, arising out of disputes between different sections of workmen as to the demarcation of their respective trades in jobs on which they were conjointly engaged. In 676 of the principal strikes 266,885 persons were engaged. Out of this number only 68,247 were entirely successful, in attaining their desires: 98,127 were partially successful, concessions being made on both sides, and 92,763 were entirely unsuccessful. The building trades achieved more success in their disputes than any other branch of industry, a fact attributed to their superior organization and other special circumstances.

The strikes of the year had an average duration of about four weeks. A close estimate places the total weekly-wages bill lost by the strikes at £381,000, which makes the total amount of wage money forfeited during the year, on the basis of the four weeks' average, more than £1,500,000. The total is figured at a much greater sum by the trades-unions. The capital laid idle by strikes is a most important consideration, and the loss thus occasioned is vastly in excess of that represented by the wages lost to employés. The amount thus thrown out in but 293 of the 4,507 establishments affected by strikes during the year was about £9,500,000. The various trades-unions were actively interested in 261 strikes, involving 51,203 persons, and the maintenance of these strikers cost the unions £146,000.

The eight-hour movement did not make much progress toward definite settlement during the year, although the question was prominently before labor organizations and employers. Several private employers voluntarily initiated the eight-hour day, but no general action was taken of any kind, and the question is still moot.

An interesting subject is treated under the head of "Public Contracts and Fair Conditions of Labor." In this direction, says the Blue-book, trades-unions and workmen generally have been very active during the year. "This activity has manifested itself in most districts by increased attention to matters of municipal government, and also in the exercise of the political influence of the unions in Parliament. On county councils and other municipal bodies a greater number of direct representatives of labor have been elected than ever before, and the cry for fair conditions of labor in work executed for the community at large has met with a large share of public acceptance and has been popular among most classes because it embodied a demand for justice not only for the workers, but for the fair and honest employer, who, in paying his men at the highest standard, was undercut by those who paid at the cheapest rates. Thus, in many public bodies now, it is a recognized principle that in all contracts a clause shall be inserted insisting on the payment to the workers of fair wages as recognized by the trades-unions, and the maintenance of such hours and other conditions of labor as are customary in the trades concerned."

The establishment of labor agencies is engaging the earnest attention of both employers, unions and workmen generally, and the tendency is largely toward making this the business of the municipal or national government. The Trade-union Congress in Glasgow last year formally declared that it was necessary a labor exchange, modelled after the Bourse du Travail of Paris, should be established and maintained by public funds in every industrial centre in the United Kingdom. The Association of Chambers of Commerce, representing the capitalists of the country, has also affirmed the desirability of such agencies, and suggests a National Labor Bureau. Considerable change, and apparent progress is manifest on this point. Employers were at first inclined to look on such propositions as socialistic, and several labor-bureaus were started by private gentlemen in a philanthropic spirit. These latter now say "the work would be much better executed by the municipality or the State." The trades-unions several years ago opposed the idea, believing such bureaus would nullify their organizations. Their change of front is evidenced in the Glasgow resolution. The testimony of the Blue-book is all in favor of the labor-bureaus, and the conclusion is stated that their action is very beneficient.

The one most notable thing about the multiplication of blue-books on labor, of royal commissions on labor, the anxiety of the politicians to treat with and please the labor vote, and the general prominence of labor matters, is that "the man with the shovel" is become a power in the State, not in England alone, but conspicuously all over Europe, a marvellous change from the old order of things. — *New York Sun.*

THE QUARTIER LATIN.

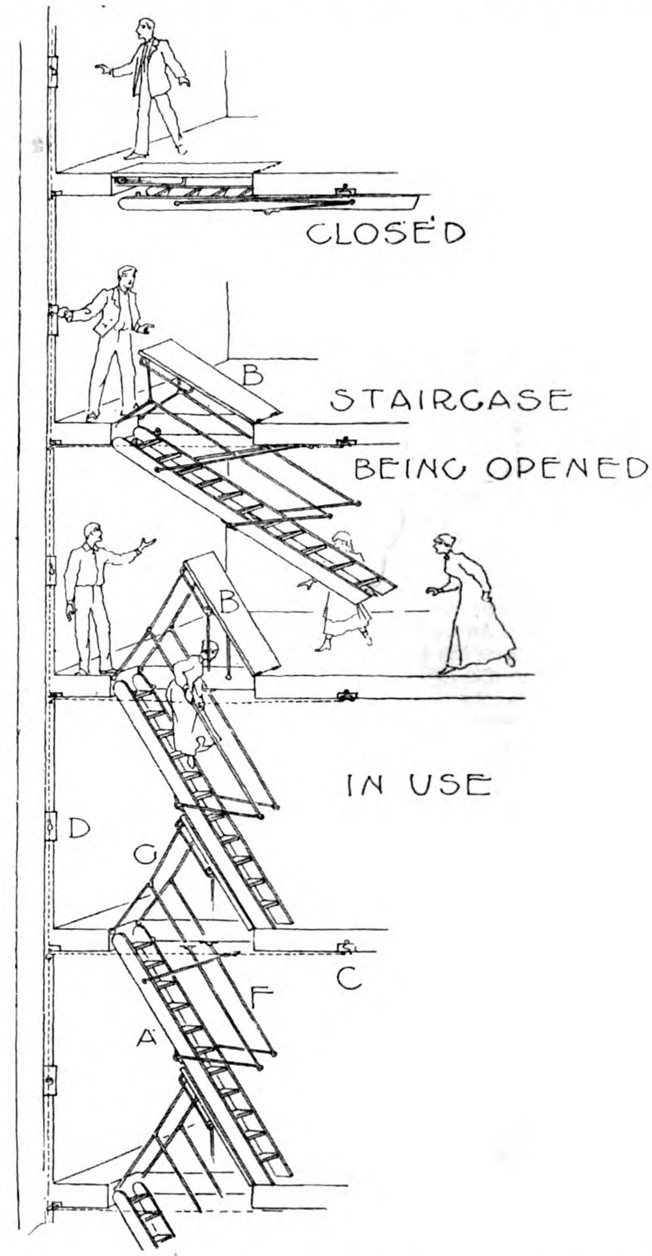
ALTHOUGH the glories of the Quartier Latin, says the Glasgow *Herald*, have long been matter of more or less ancient history, it is still not without a twinge of regret that one reads the statement of a Paris correspondent that the old scholastic buildings in it are fast disappearing and that the whole district is getting a thoroughly modern look. The old Sorbonne and the School of Medicine have been replaced by huge blocks of buildings in the style of the nineteenth century; the Law School has been enlarged and embellished; and now the shadow of the doom of renovation hangs over the Lycée Louis le Grand. It is true that none of these buildings, as buildings simply, had anything like the historic interest and antiquity of the venerable colleges of England, for upon this, as on the other quarters of Paris, the hand of Haussmann and of revolution has been laid. Yet, all the same, the removal of them takes us one step farther from the great age of what to the historian of education is certainly the most notable spot in Europe. The Montagne Latine, with its narrow streets, its tall, dark houses, its gloomy courts and low-browed archways, was not only, as Le Clerc describes it, a second fatherland to the mediæval student; it remains also, in tradition at least, as a kind of scholastic Jerusalem or Mecca. The university which had its seat there was not, it is true, the oldest of European universities, for Naples and Bologna in point of time came before it; but as the first and the greatest at which "arts" as opposed to law and medicine were studied, it was reckoned the mother of them all.

From the time of Abélard, its virtual founder, it was thronged by students, as many as 30,000 at a time, from all parts of Europe, from Lothian and Lombardy, from the banks of the Vistula and the plains of Castile. How much it was frequented by scholars from our own island may be seen from the fact that one of its "four nations" was the nation of England. And from Italy its fame attracted even the great poet of Florence, who in his exile is said to have disputed at Paris on theology, and who in the "*Divine Comedy*" makes familiar allusion to the students in the Street of Straw. A turbulent band they were, these students, deep often in disputes not at all philosophic or theological, begging at times (for they were poor enough) like Luther in the streets of Eisenbach, thieving at others with M. François Villon, and with Jean Frollo hearing the chimes at midnight and beating the ineffectual watch. They had their own judges, their rector and chancellor, by whom alone they could be punished, for as a quasi-clerical body they were exempt from jurisdiction of the civil power. But so outrageous did they grow that sometimes the civil power had to intervene, and in 1229, for instance, Queen Blanche of Castile, the mother of St. Louis, called out the military, as it were — sent her men-at-arms against them — with the result that many of the students and professors left Paris in high indignation and disgust. The University never quite recovered from the shock of this disruption, which carried many of its best teachers to Toulon and Orleans, and even to Oxford and Cambridge. One indirect result of it, however, was the institution in 1270 of the Sorbonne, the famous college which became afterwards one of the chief theological authorities in Europe, but which at first was simply a lodging-house wherein the young fledglings of divinity might be made to keep decent hours.

So old are the traditions of Bohemianism in the Quartier Latin. The scapegraces of the romantic movement were foreshadowed by Villon; the immortal quartette of Murger have their prototypes in Pierre Gringoire, and in the gamin-scholar of "*Notre Dame*." Play and work — the most riotous and reckless play, and work the most stern and laborious — are alike characteristic of this region; it has been the temple of plain living and high thinking, and the den too of orgies, such orgies, at any rate, as are possible to the prodigal who lives mainly on a precarious allowance of husks. It is true that there have been other and older Bohemias than that of Schaunard and Marcel, just as there were more ancient universities than that of Abélard. Bohemia, as was said by its annalist and *vates sacer*, has existed wherever genius and vagabondage were combined, and sometimes even where vagabondage was found without the genius. A knack of rhyming or daubing, a weakness for late hours and roaring suppers, a crop of long hair and a short purse, and a hearty acceptance of Pistol's dogma that "base is the slave who pays" — these have been known in ancient Rome and in the modern Fleet Street, as well as in the old scholastic quarter of Paris. Nevertheless, it is with this last that we associate them in especial, so that every artistic and literary waster pays his homage to the ground that has been made holy by the lives and riots and adventures of the famous *cénacle de la bohème*. Fortunately no architectural renovations can destroy the haunts of that brotherhood; Musette and Mimi and Rodolphe, no more than Pierre and the Moor and Shylock, are to be swept or worn away. The Quartier Latin has its place in that land of romance where ruin and renovation are alike unknown, and there its rush-strewn halls and fireless garrets are filled by a joyous and reckless crowd of scholars and artists, among whom the lover of literature recognizes some of his best and oldest friends.

AN EMERGENCY STAIRCASE.[1]

ONE difficulty in connection with the recent Acts under which additional means of escape in case of fire have to be provided in all factories, asylums, theatres, hospitals, and wherever large numbers of people live or are employed, is that staircases of the ordinary description occupy more space than is always available. The object of the emergency staircase, invented by Mr. S. T. Rawlings, is to meet this difficulty, and also to furnish a convenient extra exit from upper floors or galleries for all public or private buildings. It is claimed that it forms a complete and very substantial staircase, always ready for immediate use, and yet, when not in use, it takes up no available space. A series of light staircases are kept suspended under the ceilings below trap-doors placed in the floors of upper rooms, and on a catch being pulled out they drop immediately and open the trap-doors, which are so balanced as to allow the stairs to fall gently to the ground. Small cupboards in the wall of each room contain the handles D, which are connected with the wires, represented by dotted lines, for lowering the staircases. In case of necessity the glass fronts of these cupboards should be broken, which causes



a bell on each floor to ring, then, on pulling the handle D, the catch C is released, and the stairs A drop down simultaneously, opening, at the same time, the trap-doors B in the various floors, the handrails F and guards G extending on either side of the stairs, the later serving to prevent persons from falling into the opening. The stairs can be placed directly under one another in a continuous length at right angles to each other, or in any other position that may be desirable. The apparatus can be made plain or ornamental, in harmony with the other rooms or corridors in which they may be placed, and is suitable for any buildings in which a number of persons are likely to be on upper floors at any one time. Amongst other advantages

[1] The illustrations in *Invention*, after which our cut is prepared, are so imperfect that it has not been possible to determine with precision how this apparatus is jointed and pivoted. The cut must therefore be taken merely as a sketch suggestion. — EDS.

claimed for it are that it can be fixed without any structural alterations or interference with the present arrangements of furniture, fixtures or machinery; that when open it does not form a flue to attract fire or smoke; it is so constructed that it can be used by the infirm and the most timid without assistance, and, besides being so nicely balanced that if it were opened whilst persons were standing beneath, it would not drop with sufficient force to hurt them; it is so guarded that even in the event of a panic it would be almost impossible for those descending it to fall. It has been fitted up in many factories, asylums and public buildings, and is considered a practical and useful invention, easily worked, not liable to get out of order, and affording a safe and speedy means of escape in cases of emergency. Any further particulars can be obtained from the patentee and sole maker, Mr. S. T. Rawlings, South Parade Works, Frome, England, where the staircase may be seen arranged for use.

THE METROPOLITAN MUSEUM AND ITS SCHOOLS.

DURING the last ten years the Metropolitan Museum has made rapid strides. Though its permanent endowment is small, so that the Trustees have every year to make up a considerable deficit out of their own pockets, it has been constantly in receipt of handsome gifts, and the city has furnished a suitable building to contain them, which is now for the second time in process of enlargement. Some years ago the Museum seemed to contain hardly anything but the Cesnola collection of antiquities from Cyprus, other things being comparatively so few and inconspicuous. But this disproportion no longer exists. The antiquities from Egypt, the unrivalled collections of ancient glass, the Japanese pottery and carving, the tapestries, lace and embroideries, ancient and modern, the iron, gold and silver work, and the special collections, such as the Moore Collection, and the memorials of Franklin and Washington are equally conspicuous and important. Seven or eight galleries contain pictures, many of which are famous masterpieces, and remarkably few of which are of inferior quality, while the collections of casts of architectural details is one of the largest, most carefully selected and best arranged in existence, and the models of the Temple at Karnak, the Parthenon, the Pantheon and the Cathedral of Notre Dame are the only ones of their kind. The new wing is to contain a collection of casts of ancient and mediæval sculpture, which will give the Museum in this respect also a foremost place among the great museums of the world.

Meanwhile the Trustees have not forgotten that a museum is made for study as well as for diversion, and have from time to time set on foot classes in drawing, painting, modelling, bronze and iron work, architecture and ornamental design. It is now, however, no longer necessary for the Museum to give elementary and preparatory teaching. This is as well or better done elsewhere. The Trustees recognize, as the prospectus they have lately issued proclaims, that their main duty in the matter of education is to make their collections intelligible and serviceable to the public and to students of art. To this end they propose, as the means at their disposal may permit, to arrange for public lectures upon the various branches of art illustrated in the Museum, and to organize special classes of artists and artisans for the special study of different collections. At the same time the elementary classes in drawing and painting, from the antique and from the life, which are already established, will be continued, at least for the present, in the hope that they may become self-supporting. Then the funds at present consumed by them can be devoted to other uses more germane to the Museum's proper work.

These classes are in the best of hands, under the general direction of Mr. H. S. Mowbray. He has as his assistants, Mr. Levy, Mr. Clinedinst and Mr. Beckwith, in drawing or painting, and Mr. Herbert Adams in modelling. The fees are very moderate, being only thirty dollars a year, and forty for the life class, which, however, is open only to women. The rooms are well-lighted and comfortable, and the instruction of the best. The reputation and experience of the teachers would be ample warrant for that. Last year they had one hundred and forty students.

In addition to these classes, the Trustees have already begun the work of directly utilizing their treasures for purposes of instruction. For the public, they, last winter, under arrangement with the Trustees of Columbia College, set on foot a course of free lectures, which were largely attended, and it is proposed to have other courses from time to time, given by experts in the various arts which the Museum illustrates.

They have also established a class in architectural drawing for the special study of the architectural casts and models. Twenty-five students last year attended this instruction, which, so far as it goes, is exactly the same as that in the Department of Architecture in Columbia College. It fits young men to enter offices as draughtsmen, or to pursue to advantage elsewhere more advanced studies in architecture or in the decorative arts. The fees are fifty dollars a year. The class-work comprises exercises in pencil and brush work, in architectural drawing and design, and in projections, shades and shadows, and perspective.

But the most important and interesting class is an advanced class in painting, established under Mr. La Farge's care, for the study of the collections of paintings, the members of which may become candidates for the Jacob H. Lazarus Travelling-scholarship. It consists of young artists, both men and women, who have got through with their preliminary studies, and most of whom have studios of their own. To these will this year be joined the best students from the National Academy and from the Art-Students' League, who will be admitted free of charge on the recommendation of their instructors. Prize-students will also this year be present from Buffalo and Detroit, and probably from Boston and Washington, and efforts are making to send young men also from Chicago, St. Louis and Baltimore. These students will meet Mr. La Farge at the Museum twice a week, and make such drawings, paintings and sketches as may be required of them, working partly in the Museum or other galleries, partly in their own studios. The character of these exercises is, in the case of each student, necessarily determined by his attainments and personal predilections, and they are arranged so as to aid rather than to interfere with his own studies or work. The men of the class, which is, however, as has been said, open also to women, may in the spring become candidates for the Lazarus Scholarship. This gives the successful competitor a hundred dollars a month for two years, with which to travel and study abroad.

This is the most advanced step taken in this country in the way of artistic education, as it is the most generously endowed. It has been organized under the advice of many of our best artists, and the effort to extend its advantages to students outside of New York has met with the cordial coöperation of the schools and of the friends of art in other cities. If it is followed, as will probably be the case, by similar classes for the study of other collections, the Metropolitan Museum will take a leading place among our places of higher education.

SOCIETIES

ARCHITECTURAL SKETCH-CLUB OF THE UNIVERSITY OF TENNESSEE.

THE Architectural Sketch-club of the University of Knoxville, Tennessee, is the title of an organization at that institution, organized one year ago for the purpose of creating an interest in the study of the art of all arts, architecture; and in the hope of influencing the Board of Trustees to establish a chair of architecture in the University.

The work designed for this year consists of drawing up specifications of various kinds and styles of buildings, making full working and detail drawings of same, making estimates on work, visiting buildings in process of construction, and several other features.

We also intend having a prize competition. Subject to be an "Academic Building for a University," prize to be a gold medal.

The prospects for the work of the club this year are very flattering, any suggestions, however, as to the best methods of conducting such an organization will be kindly received by either the President, W. L. Morgan, or J. B. Brown, Secretary.

SKETCH-CLUB OF NEW YORK.

THE regular October meeting of the club was held on Saturday the 7th inst. It was the first meeting in the new rooms, which are much larger than the old quarters and better adapted for serving dinners. Forty-five members sat down to dinner and over fifty were present during the evening. Mr. Richard M. Upjohn was the guest of the club and spoke of his recollection of the building of Trinity Church, of which his father was the architect. He also criticised the design for a gothic rose-window handed in at this meeting. There was an informal exhibition of summer work; forty-five sketches being hung on the walls. The regular winter classes of the club will begin this month. EDGAR A. JOSSELYN, *Recording Secretary.*

THE ILLUSTRATIONS

[*Contributors of drawings are requested to send also plans and a full and adequate description of the buildings, including a statement of cost.*]

THE HOTEL WALDORF, FIFTH AVE., NEW YORK, N. Y. MR. H. J. HARDENBERGH, ARCHITECT, NEW YORK, N. Y.

[Gelatine Print issued with the International and Imperial Editions only.]

HOUSE OF STANLEY MORTIMER, ESQ., ROSLYN, LONG ISLAND, N. Y. MR. JAMES BROWN LORD, ARCHITECT, NEW YORK, N. Y.

MARYLAND STATE PENITENTIARY, BALTIMORE, MD. MR. JACKSON C. GOTT, ARCHITECT, BALTIMORE, MD.

STORE AND APARTMENT BUILDING FOR THE BENNETT & PEAK HEATING CO., CINCINNATI, OHIO. MR. WILLIAM MARTIN AIKEN, ARCHITECT, CINCINNATI, OHIO.

PATERSON SAVINGS INSTITUTION, PATERSON, N. J. MR. CHARLES EDWARDS, ARCHITECT, PATERSON, N. J.

THE CHÂTEAU DE VITRÉ, FRANCE.

[Additional Illustrations in the International Edition.]

THE CATHEDRAL OF LAON, FRANCE.

[Copper-plate Etching.]

ALTHOUGH the larger part of this building dates from the thirteenth century the greater antiquity of the *motif* of its design can be discovered by covering up the towers, whereupon the basilican character of the lower portion at once discloses itself. As M. Boussard says, "Some nameless miscreant, who could only have been a monkish architect, has plastered against the base of the west front the three porches intended to protect the faithful from inclement weather. The idea was well enough but what further excrescences have been countenanced by the absurd inspiration! The towers which crown this Roman basilica are needed as an offset to the pepper-pot Norman *tourelles* of the neighboring château and at the time served to remind the world that between the people and their feudal superior, in fact above them both, there was the clergy. In truth it was at Laon that the standard of revolt was first raised against Louis-le-Gros under the leadership of the clergy."

FOUNTAIN IN THE COURT OF THE PALAZZO VECCHIO, FLORENCE, ITALY.

[Copper-plate Etching.]

PREMISES: SOUTH AUDLEY STREET, W., LONDON, ENG. MESSRS. ERNEST GEORGE & PETO, ARCHITECTS.

MUNICIPAL TECHNICAL SCHOOL, BIRMINGHAM, ENG. MESSRS. ESSEX, NICOL & GOODMAN, ARCHITECTS.

THIS week we further illustrate the design selected by the Birmingham Corporation for this school.

The principal or ground floor is raised to admit light to the lower floors, and contains the rooms for the general and administrative department.

The lower ground-floor and basement are nearly all above the adjoining pavements; they contain the metallurgy and engineering departments, with the exception of the drawing and lecture class-rooms, which are on the upper floors; in the basement level a range of two and one story shopping contains the engines, dynamos, smithy and stamping shops.

On the first floor is the physics department, the rooms of the west wing being for experimental work and those in the east wing for electrical engineering and telegraphy, the centre being occupied by the physics and chemistry lecture-rooms and their preparation-rooms. The second floor contains the women's department and botany and geology class-rooms. The third floor contains the chemistry laboratories, with north light.

Lavatories for each separate department are placed on the north side of the corridors, separated from the rooms, lighted from the smaller areas. The main entrance is from Suffolk Street, and communicates with two well-lighted staircases connected by corridors on each floor; the central flight in entrance-hall leads to the ground and upper floors, whereas the side entrance gives access to the lower floors; separate entrances are provided in the lower ground and basement floors. The buildings will be of fireproof construction, having brick walls finished with buff terra-cotta dressings inside and outside; the outside facings will be red bricks and inside buff bricks, the assembly-hall and principal rooms being dadoed with oak and ceiled with ornamental plaster-work. The window-frames in the workshops and laboratories to be of specially-constructed fine cast-iron patterns and wrought-iron casements, and in the lecture class and other principal rooms deal casement frames with opening sashes, or sash and case with fanlight in the upper part, as most suitable to the apartment. The floors will be formed of breeze concrete filled-in between steel or iron flooring joists and girders. On the top of the main cornice, which has a width of three feet six inches, will be fixed a wrought-iron balcony-railing, with wrought-iron outside escape-ladders to pavement, and special exit-doors from upper floors to same. The staircases will be fireproof and of granolithic stone or slate slabs upon steel bar and latticed girder supports. The scheme for heating and ventilating adopted is by propelling air over calorifiers in the basement, the extract flues being connected with two upcast shafts. It is expected that building operations will be commenced early in October, and completed in time for the opening of the winter session of the school in 1894–95.

MUNICH. AFTER A DRAWING BY SAMUEL PROUT.

COMMUNICATIONS

[*The editors cannot pay attention to demands of correspondents who forget to give their names and addresses as guaranty of good faith; nor do they hold themselves responsible for opinions expressed by their correspondents.*]

ART SENSE AND ART NONSENSE.

BOSTON, October 3, 1893.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — In rejoiner to your comments on my last communication I will attempt to answer some of the questions which you have put to me; but, from the nature of the case it is difficult to give one's personal experience without offence. You ask, "How large a percentage of mill and industrial buildings have ever been entrusted to the care of such architects as have shown themselves competent to produce artistic results when equivalent sums of money have been entrusted to their handling."

I will mention three cases in my personal experience of which I can speak without hurting the feelings of any living person. In one instance in which it was desirable that a certain large factory building should appeal to the eye by its artistic proportion and construction, a professional architect, who, among all those that I have known, possessed more of the element of what we call "horse sense" than any other member of the profession then living, was entrusted to make the design under the general direction of an engineer. This was thirty years ago, and I was then in a subordinate position in connection with this factory and had not obtained my present experience in the profession of underwriting. The mill was constructed without consultation with the Factory Mutual underwriters until it was completed — the useful practice of consulting the underwriters prior to construction not having then come into vogue. When that mill was presented for insurance the necessary alterations to make it suitable to be insured on the mutual principle cost about ten thousand dollars and the roof story was permanently deprived of one-third of its value.

In a second instance, where I had occasion to put up a workshop under my own supervision, I procured plans from an architect, now deceased, to whom the general conditions of the problem were submitted. The result was the suggestion of a tower so incorporated in the building that it could not be treated separately and which by itself would have cost more than the entire building with a suitable tower afterwards cost.

The third case is very recent. An inventor possessing an unusual element of business capacity came here from a western city to build a workshop in which he might make special articles of metal that are consumed in greater measure in New England than they are in the West. He bought a piece of land in the neighborhood of Boston, having brought with him three sets of plans for his building made by professional architects. The previous owners of the land happened to advise him to come to me and he presented his three plans one after another for my consideration. I was obliged to condemn each one successively as being either unsuitable, unsafe or too costly. I then advised him to inspect a workshop that had been built in the manner corresponding to the enclosed drawing; which he did. He found it so exactly suited to his purpose that he borrowed the blue prints originally supplied from this office, by which that shop had been constructed, and he duplicated it with slight changes made on his own behalf. He then employed a skilful builder whom I named to him who was thoroughly familiar with mill construction and that shop is now a model workshop — one of many of this kind that have been built in all parts of the country.

I venture to suggest that you reproduce the picture of this workshop and put it as a problem to young architects to give it architectural effect — in place of the many customary problems, or supplementary thereto, which are given them in the course of their instruction, such as a "casino in a garden" or "a porch to a palatial dwelling," and other problems, as remote from American industrial life as can be conceived. Is it in the power of art to give a better or more satisfactory aspect to a workshop which must yet be in every respect consistent with the interior motive of the work for which this type of building is now constructed, corresponding to the picture sent herewith. If not, then the Philistine method must prevail.

I also enclose our No. 7 in section and plan. How shall they be clothed with our outer wall and tower of good effect without excess of cost? That would be another useful problem in æsthetic architecture.

Your second question is, "How many workmen having one thousand dollars to spend resort to architects for their designs as compared to those who go to the nearest carpenter?"

To this I reply, very few, if any. May there not be a good reason, not only for the workman who has a thousand dollars to spend, but for many well-to-do persons who may have a much larger sum to spend, being very cautious about adopting the plans for houses that are made for them by many architects without consulting the carpenter, lest their money should be exhausted long before the house should be finished? I have known some melancholy cases of

this kind even when architects of high repute had the sole control. In recent years I am assured there has been great improvement in this matter and that there are architects whose estimates can be depended upon, whose buildings are sometimes completed without a large bill of extras.

But is this a matter wholly resting with the individual workman? Are there not a great many instances of what may be called speculative operations entered into by people of large capital for the construction of small dwelling-houses in considerable number which shall attract tenants and buyers for adjacent lots? In how many of these instances have the small dwelling-houses, even when constructed by professional architects, been models of stability, safety, slow combustion, freedom from vermin, convenient, subject to very light repairs in long periods and yet built at a low or even lower cost (as they may be) than the ordinary examples? Are not these architects' houses usually of light framework covered-in with open boarding, single plastered, surmounted by crazy roofs enclosing attics which are ovens in summer, refrigerators in winter; the outside decorated mainly with the jig-saw? I am very confident that there is a field for the application of solid, slow-burning mill-construction, free of open spaces, warm in winter, cool in summer, in which an architect of repute could find constant employment for one department in his office that would much more than pay its way in planning and constructing workmen's dwellings of low cost. I know that this method of construction can be adopted at as low a cost as the ordinary examples of cheap dwelling-houses which I have cited — which are truly "cheap and *nasty*," such being the only combination of words by which they can be designated after they have been occupied by the ordinary workman's family for a short time, even in spite of the effort of the fourteen-hour wife who works arduously in a vain attempt to keep it in order, because their faulty construction forbids cleanliness.

I cannot answer the question whether the great artists whom you name designed industrial buildings or workmen's homes. The industrial building in its modern sense was unknown in their time. Had it not been, I believe that the motive of the industrial building working in their great minds would have enabled them to solve the æsthetic problem on that motive as surely as they have solved it on the motives on which they did work.

You remark that "if an architect is one who by *instinct* would produce a beautiful effect regardless of cost and excess of strength, and if an engineer is one who by *instinct* would produce a structure economical in cost, having no useless surplus of strength and absolutely disregardful of looks, they must perforce in these days of haste and complicated living be employed together to produce those fully satisfactory results which we desire."

I differ with you. Neither the *instinct* of the architect or engineer will accomplish either object. Both must be thoroughly trained in the drudgery of each profession and when each has developed the type of work to which his instinct may have given the first direction, but in which his thorough training finds its last expression, it may happen as in the days of old, that both functions may be found in the one man and he will then be the one architect worthy of the highest esteem. No man can be a true architect who is a mere artist in the conventional use of that word until the art instinct and the engineer's capacity are thus united in one. The work and the training of each must be combined in even proportion and of equal importance, to the end that the mere instinct of each may be rendered subordinate to the motive of the problem dealt with. When that is accomplished the right expression of that motive will be found in a structure that will be safe from the criticism of other artists and of other engineers. I have heard a great deal of talk about the "art sense," but I have seen many concrete expressions of what I can only name "art *non*-sense" in many modern buildings.

Your last remark is to the effect that the capitalist is "the most confirmed of gamblers" in dealing with construction. In this I take issue with you. The capitalists who construct factories, workshops and industrial buildings are as far removed from the type named by you as it is possible to conceive. Between them and the type of capitalists whom you have stigmatized there is a middle term. There are capitalists who furnish the means for constructing buildings in the city of which the lower stories are occupied for distribution, the upper stories for industrial purposes. They have shown their readiness to expend their money lavishly under the direction of professional architects for the purpose of giving æsthetic effect to the elevation, form and structure of the buildings. But I can cite to you many examples of this mixed type of buildings in which the upper stories which should have been replete with light, fresh air and opportunity for ventilation are dark and unwholesome, unfit to be crowded with working people as they are; because the architect who constructed them was one-sided — because he devoted his whole capacity to the æsthetic appearance on the street, to the sacrifice of utility, and at the risk of safety and wholesome conditions of those who are confined to their work in these upper stories.

I admit that there have been profound difficulties standing in the way of the professional architect, especially in the construction of city buildings of this mixed type; due to the necessity for extensive areas of glass in the lower stories which cannot be easily made artistically consistent with the customary methods of planning and constructing the upper stories. But it is evident that of late there are some architects who have succeeded in solving this problem and there are buildings in this city which can be readily designated, in which the lower stories have the abundance of light that is required and yet possess the elements of, as well as the appearance of strength and stability corresponding to the upper portions of the building, while the upper parts of some of these buildings have also been dealt with in due consideration to the purposes for which they are occupied.

Admitting this progress in city architecture, I might point out to you a few examples of factories built consistently with the rules of mill construction, and which are adapted in every manner to their use, in which the engineers have succeeded in dealing with the great mass, the fine proportion, the tower, the parapet and the pilaster in such a way as to give an air of repose, rest and of mass, of permanence and of stability to the whole work, and who have brought out some imposing effects consistently with the motive of the building, which I think would be admitted to be true and genuine by any true artist.

There is one class of buildings on which professional architects are customarily employed and in which the motive that governs the construction of the factory ought to be the most potent and in which ventilation and wholesome conditions should be most perfect. I refer to hospitals and asylums. I know of no class of buildings which were constructed earlier than about 1880, including very many recently built, which are on the whole of such ill repute on all these points of safety, stability and true hygienic method as this class. As a rule, they are surmounted by roofs of the worst possible type — they are pervaded by combustible cells in every direction — they have cost twice or thrice what they ought to at a true standard, and they can only be removed by the cremation of the buildings which is very apt to be accompanied by the cremation of many of the inmates. Only within a very short time have there been some conspicuous exceptions to this general condemnation, in hospital buildings which have been rightly constructed at a very moderate cost.

I would not have you impute to me a prejudice against architects or against the profession. On the contrary, I desire to see the profession raised to the high level of the opportunity which is waiting for its practice in buildings adapted to the motives of peace, order and industry. You must bear in mind that the very existence of the factories and the very life of my own profession must be governed by the motive on which these factories are constructed.

The policy by which we are, perforce guided, may be stated in these words: "Beware the methods of combustible architecture, and distrust all who are guilty of its practice — whether owners, builders or architects — whatever their respective shares in this evil method may be." Bear in mind that ninety-five per cent of the construction of this country comes under that condemnation.

The fault is mainly with owners, capitalists and investors, and yet not wholly. Are they so much to be blamed when he who may be called the "Chromo Architect" takes such a prominent position in the profession, imposing upon the ignorant his showy but sometimes picturesque elevations of sham construction in brick, stone or iron, behind which his own ignorance or incapacity in the art of building is concealed?

What is the origin of Combustible Architecture as it has been developed by the Chromo Architect? If I am not greatly in error, the fault lies deep in a false method of construction. If I am rightly informed, instruction in the École des Beaux-Arts begins with the art of design and ends with instruction in the principles of building, which may be complete, but is seldom followed to the end by American students.

Moreover, it begins and deals mainly with the Roman or Renaissance point-of-view, not with the simpler and truer Greek art. It may be held that the City, as an entity, originated with Rome, and that the development of the City is Roman, and not Greek; but the modern city differs from the ancient as much as the industrial motive of this country differs from the motive of conquest, or defence, or superstition, of which the Roman, the Ecclesiastical and the Renaissance styles were the outcome.

Whether we are right or not, we Philistines must continue to say: "'Ware the architects (I hope the editor will not impute any personal reflection) whose instruction begins with the designs of Greek temples, Roman porticos and Renaissance windows, and who has not completed a full course and taken a degree in the principles of construction, including the main elements of engineering."

Philistines like myself are the very ones who, like most of our school-committees and committees for the construction of hospitals and asylums, may be imposed upon by the Chromo Architect, and may be misled into a waste of money in unsuitable buildings, unless we keep our fire-eyes wide open and hold to our own Philistine method rather than submit to be misguided by false or meretricious art. Here endeth this chapter for the present. The Editor has the last card, and it may be the ace of trumps.

EDWARD ATKINSON.

P. S. Oct. 4th. On reviewing in my mind the communication which I sent to you yesterday, I think that even with the qualifying clauses at the end, the letter may have a hard and unsympathetic sound to the young architect who has hard work to get a living. I am fully aware of the grave difficulties which stand in the way of a young architect just entering upon his profession. In making any attempt to alter or change the customary type and style of buildings,

his work would be as profitless as my own in attempting to promote a revolution in the domestic kitchen and in the processes of cooking. Yet both undertakings must be followed to the end. The appetites of the mass of the people have been depraved by the American frying-pan and the propensity for hot biscuit, and it will take one or two generations to bring about a wholesome change in the habit of nutrition. In the same way, the demand upon the architect has been depraved by years of indulgence in crazy roofs and mustard-pot towers, profuse ornamentation and outside effects of the chromo style. In order to get a living, the architect who supplies this depraved taste, or rather, lack of taste and knowledge of what is needed, must meet it; he must attempt to guide his clients, rather than to set himself against them, else he may work his whole life without profit.

The remedy must begin with the foundation. The problems which I long endeavored to have put before the students in architecture while I was a Director of the Institute of Technology consisted of the questions with which I was called upon to deal myself. I would make the problems given out to students in every school of architecture, to the extent of one-half the number submitted, of a prosaic type. One would be the lay-out of an industrial town; choosing as a possible site a bit of unoccupied land somewhere in the neighborhood of the city with a stream running through it, corresponding to a site by a river where power might be generated, or by a landing-place for the fuel from which the power might be derived. To one pupil I would assign the lay-out of the land; to another the water-supply and drainage; to another the construction of the principal factory; to another the construction of the lesser workshops; to another the grocer's and other shops; to another the blocks of dwelling-houses~~; to another~~ the separate dwellings; to others the ~~Catholic~~ and Protestant churches; to another the hospital, and ~~to~~ others the school-houses. Here you have the real problems ~~of~~ American industrial life, scarcely one of which has yet been taught or solved in the right way, so as to combine true art with utility and safety.

I may say that the practice of the architect on each and all of these problems is now empirical, taking little or no cognizance of the interior motives or their combination in such a village. I think you will admit that if such a problem were distributed among a certain number of the graduates of the schools of architecture of this country, chosen without discrimination at their graduation, the result would be wholly unsatisfactory. There would be no order, method or common design governing the whole; yet there are general and common and substantially uniform rules which might be applied to each and every one of these buildings, and which, if applied by men possessed with a comprehension of the American motive, would produce as harmonious a result, even without a consultation, as the Hellenic dream in Chicago, which will vanish, leaving little or nothing that can be applied to the construction of permanent buildings, or which, if applied, will be as much out of place as the Grecian portico executed in pine wood on the front of a country house.

Until some such course is taken, the young architect must cater to the present depraved demand, in supplying which he expects to get his living. The stream cannot rise higher than the source. School-committees, hospital-committees, even State-commissions, as well as the average owners who invest in buildings, will continue to be attracted by showy, plausible and well-executed designs and elevations, suitable or unsuitable as they may be to the purpose of the building. From such sources the architect must derive his income. All that can yet be expected of the young architect is to put good construction within these pictures in place of the very bad type of construction which is so common.

He can readily induce an owner to adopt solid and safe methods of timbering. He can persuade the owner not to sheathe brick walls with combustible woodwork varnished in such a way as to render complete destruction almost certain from a very small fire. He can persuade church-committees not to connect the hollow floor of the church by wooden flues with the peak of the roof. He can almost compel the dullest employer to adopt safer methods than are now so common, because if he comprehends his own business he can prove that the safe methods are cheaper and more truly attractive to tenants than the unsafe ones which are now so commonly practised.

I reminded you that you held the last trump, and you might play it on this chapter, ending the game; but I warn you that I have several trump-cards that I always hold in reserve in my sleeve for future deals. E. A.

[IT is not the lack of cards, trump or otherwise, but of space that prevents our making a rejoinder to some of the points raised by Mr. Atkinson. — EDS. AMERICAN ARCHITECT.]

NOTES AND CLIPPINGS

COMPULSORY INSURANCE OF LABORERS IN SWEDEN.—The question of insurance of laborers has for quite a series of years attracted considerable attention in Sweden, where a Royal Commission was appointed in the year 1891 for the purpose of investigating the matter and the report of this committee is now completed. The principle of the proposal contained in this report is a compulsory insurance for the purpose of establishing a pension for every able-bodied man or woman who has completed the eighteenth year and who is employed by others for a remuneration not exceeding 1800 kr. (100*l.*) per annum. If the laborer begin to work for himself (or herself), or if he be out of employment, he no longer, for the time being, comes under the operation of the proposed Act. He is not only relieved from, but he loses his right to insurance, as the proposal does not acknowledge voluntary payments of premiums. He does not, however, forfeit the right to the pension which will ensue from the premiums already paid. The conditions for employment are, however, not very rigid, the fact of a person having been employed all the working days of a week by the same master sufficing. The weekly premium has to be paid every pay-day by the master, who himself defrays half the premium, the other half being deducted from the laborer's wages. This insures an annual pension of a fixed sum of 50 kr. (2*l.* 16*s.*) and a varying sum, which increases proportionately with the number of the weekly premiums paid; the pension becomes due when the insured has reached his seventieth year, or, if he, before that age, is incapacitated without any palpable negligence or intentional act on his part. At the death of the insured his legitimate children obtain each a yearly pension of 30 kr. (1*l.* 13*s.* 3*d.*) until they have reached the fifteenth year and the insurance also comprises the wives of married laborers, for whom no special premiums are paid, unless they themselves are so employed that insurance becomes compulsory. The widow of a laborer is, consequently, not entitled to a pension because she becomes a widow. The condition for obtaining this pension is a payment before the sixtieth year of 260 weekly premiums, unless the insured become incapacitated whilst in such employment that he is under the compulsory insurance. There are three classes, viz: 1. Male laborers earning 10 kr. (11*s.* 1*d.*) or more a week. 2. Male laborers not earning 10 kr. a week. 3. Female laborers and wives of male laborers. The weekly premiums of these three classes are respectively 50 öre (6 2-3*d.*), 30 öre (4*d.*) and 20 öre (2 2-3*d.*) and the variable pension rises respectively 10, 5 and 2 öre a year for each paid premium. If premiums have been paid the minimum time of five years, the annual pension will be respectively 76 kr. (4*l.* 4*s.*), 63 kr. (3*l.* 10*s.*) and 55 kr. (3*l.* 1*s.*); if the premiums have been the maximum number of years, viz, 52 years (from the 18th to the 70th year), the pensions for the three classes will be respectively 320 kr. (17*l.* 16*s.*), 185 kr. (10*l.* 6*s.*) and 104 kr. (5*l.* 16*s*). The State pays with the municipalities all the expenses of administration, etc., and pays, at least for some time to come, 2 öre pension a year for each premium paid. — *Engineering.*

SUGGESTED ANNUAL CENSUS OF THE UNEMPLOYED. — We spoke last week of the census of the unemployed in Chicago, which showed that 75,000 men in the skilled trades in the Western Metropolis are idle. A newspaper in Philadelphia has since made a similar count for its city, with results which show that some thirty thousand men are without work there. This latter enumeration, however, though it may be correct, will lack the authority, and, for the general public, the convincingness of the Chicago census, because the latter was taken by the city police in a systematic way. It seems to us that the officials of New York might with great advantage undertake, from time to time, similar enumerations. We saw how easily such work can be done when the municipality made its census to check or verify the federal count of New York's population. Statistics of this sort are not mere valueless figures. They give the business men of this country information as to the condition of industrial affairs which cannot be obtained in any other way, and which would be as valuable to manufacturers, merchants and artisans as clearing-house statements or reports of the condition of the Treasury at Washington. In times like the present they would be of special significance. Indeed we venture to say there are no figures that have appeared lately *apropos* of the industrial depression which have been of as much account as the Chicago figures of the unemployed and the similar figures concerning Philadelphia. — *Record and Guide.*

THE T-GIRDERS USED BY THE ROMANS. — In discussing the use of iron on a large scale by the Romans, Mr. Gardner writes: "From Pompeii we might infer the total absence of constructive ironwork in Roman architecture, yet Professor Aitchison claims that in the Baths of Caracalla a large ceiling was supported on iron girders." This fact might be stated less doubtfully than these words would imply, since some tons of broken iron T-girders were found a few years ago during the excavation of the great cella soliaris of the Thermæ of Caracalla. These girders had been cased in bronze, and they were arranged so as to form square panels, which were filled-in with concrete decorated with mosaic and delicate stucco reliefs, all colored and gilt, thus forming a strong and richly-decorated flat ceiling, with a span of enormous width.— *The Saturday Review.*

THE VALUE OF HANDS AND FINGERS. — The comparative value of the hands and fingers have been estimated in a scale supplied by the Miners' Unions and Miners' Insurance Companies, of Germany. The loss of both hands is reckoned as a depreciation in working capacity of 100 per cent; of the right hand 70 to 80 per cent; left hand, 60 to 70 per cent; thumb, 20 to 30 per cent; right forefinger, 14 to 18 per cent; left forefinger, 8 to 13.5 per cent; third finger, the least in value, 7 to 9 per cent; little finger, 9 to 12 per cent. The range in percentages is due to the differences in occupations. — *Invention.*

THE DURABILITY OF INDIAN TIMBER. — Since 1881 the durability of thirty-nine different Indian timbers has been under test at the Forest School in Dehra. Perpendicular posts, half under ground, were used, and one by one the softer and weaker woods disappeared, under the attack of rot and white ants, until a short time ago only three of the timbers remained sound. These were Himalayan cypress, teak and anjan, which had been exposed ten, nine and seven years respectively. — *Invention.*

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Stanly Mort
Roslyn.

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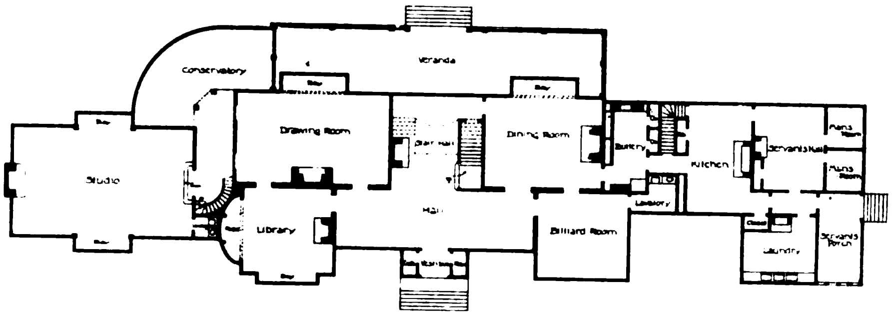

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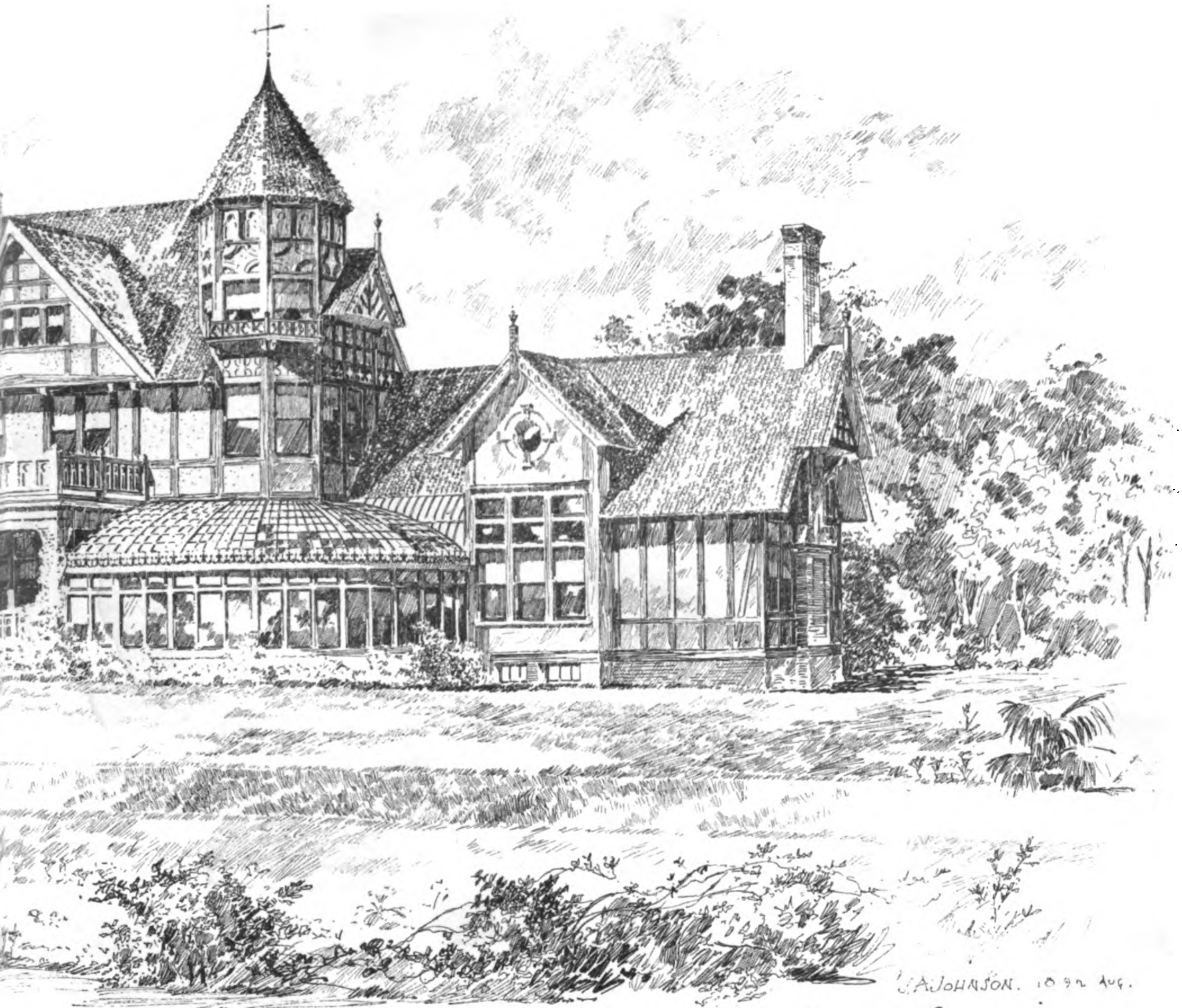

Jas Brown Lord. Archt.

[...]
[...] Turner Esqr.
[...] Long Island.

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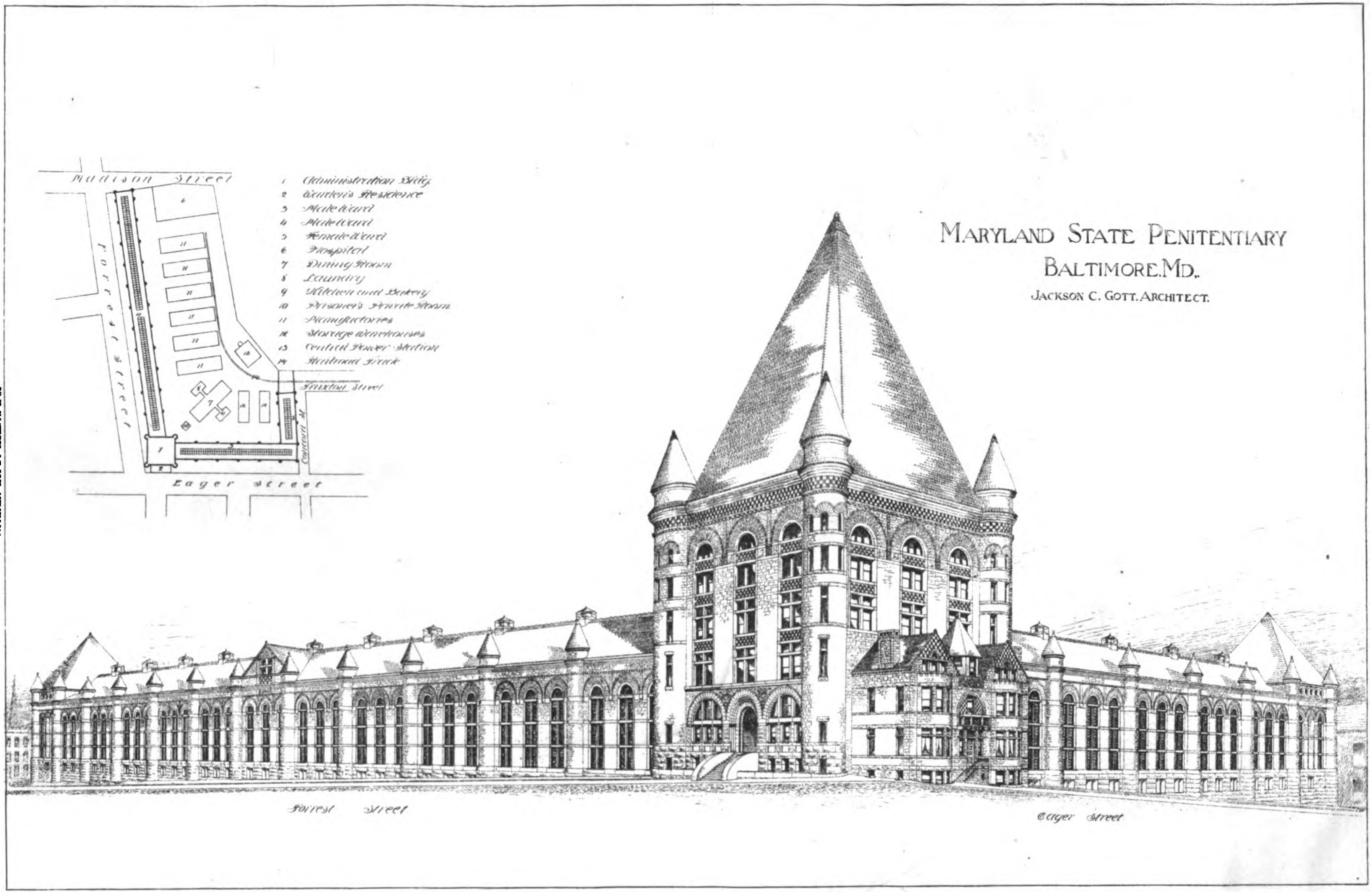

MARYLAND STATE PENITENTIARY
BALTIMORE. MD.
JACKSON C. GOTT. ARCHITECT.

AMERICAN ARCHITECT AND BUILDING NEWS, OCT. 14 1893. No. 929.

DESIGN FOR STORE AND APARTMENT BLDG
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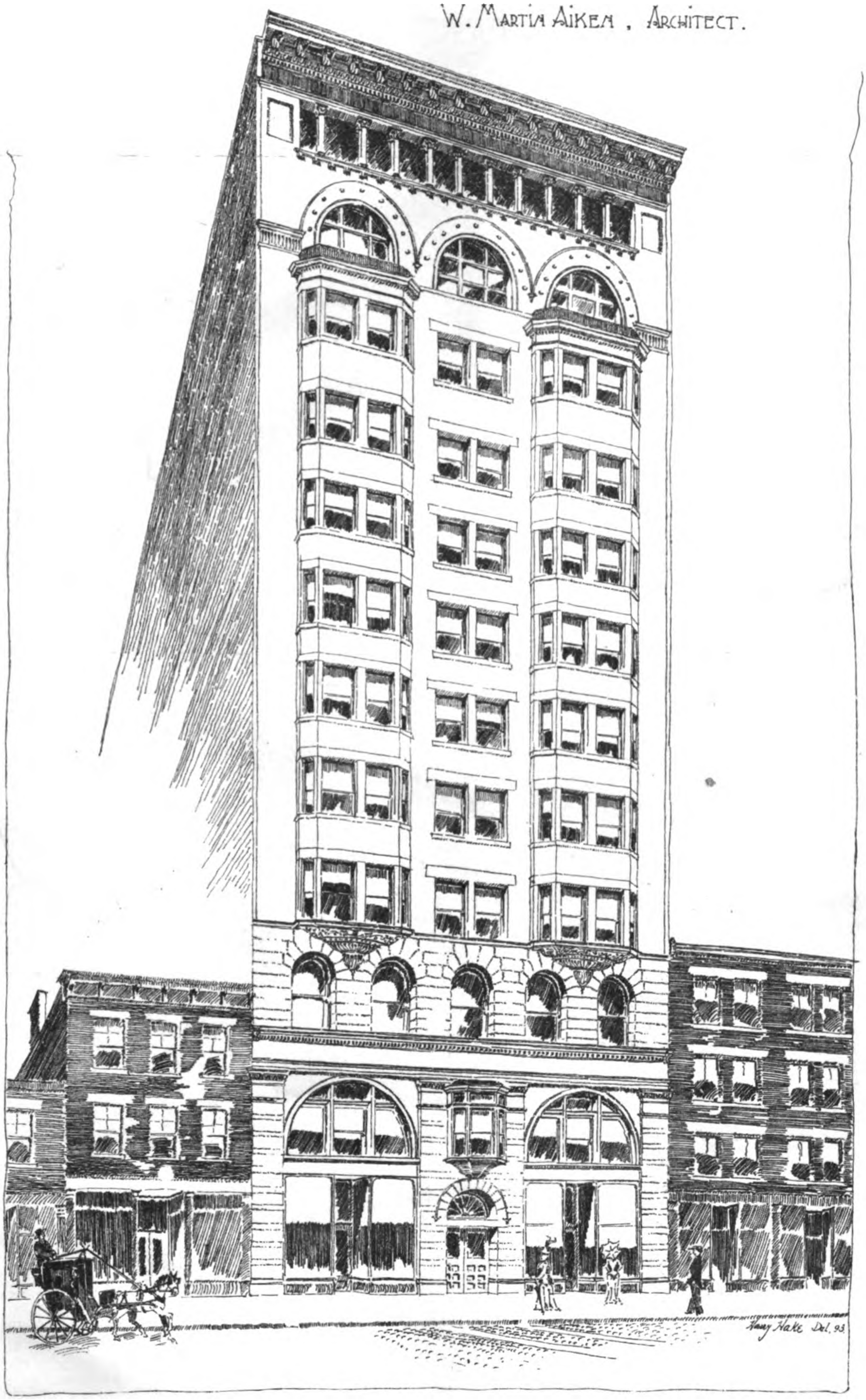
W. MARTIN AIKEN, ARCHITECT.



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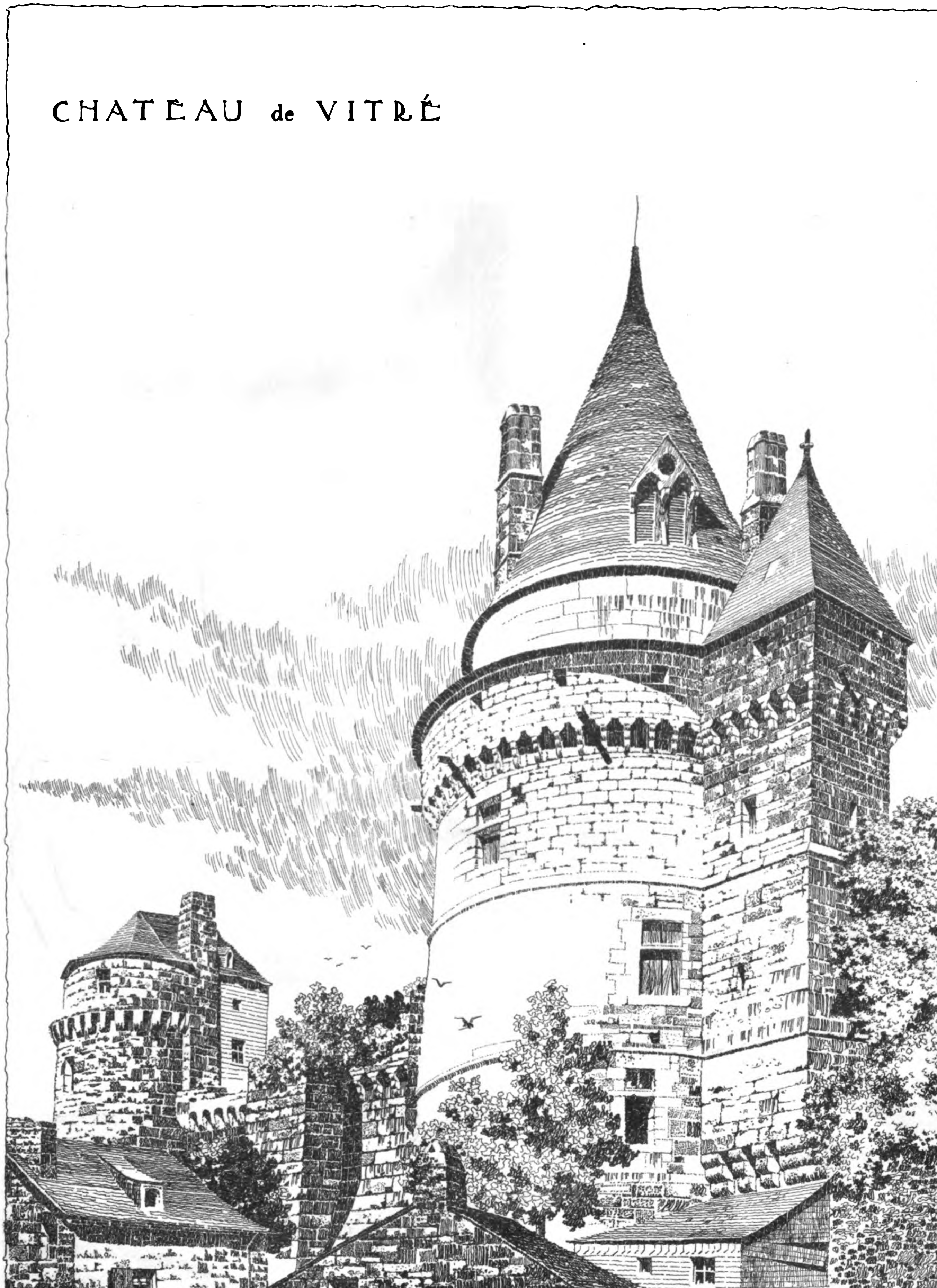

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OCTOBER 21, 1893.

CONTENTS

THE architects of the buildings devoted to the military service of the State of New York do not seem to find their position altogether enviable. We have before had occasion to mention some of their troubles, and a fresh mischance has occurred to illustrate the rule. An armory is now building for the Seventy-first Regiment, on Thirty-fourth Street, from the designs of Mr. Thomas. A few days ago, a meeting of the Armory Board was held, at which the secretary reported that "a serious blunder" had been made in the construction of this building. "Mr. Thomas's plans," he said, "had lacked clearness, and when the builder followed instructions, he found that the wall on the west side did not meet the roof, there being a space of about six feet all along the side." We need hardly say that experienced members of the profession are well acquainted with the builder who, when he has a grudge against an architect, or wishes to get a hold on him for purposes of his own, discovers "blunders" in the plans, but it is surprising to find that the Board, on the simple repetition of the builder's tale by the Secretary, immediately "fined" the architect four hundred dollars for his "mistake," without, apparently, giving him any chance to be heard, or making the slightest effort to discover the truth of the matter. Judging from the analogy of many similar cases, it is probable that the trouble, if there was any, was due to the carelessness of the builder himself. To say that a builder, having to cover with a roof a space enclosed by four walls, could not make the roof reach the walls on account of the lack of "clearness" of the architect's plans seems, to an expert, very much like a joke. Did the plans show the roof resting anywhere else than on the walls? If not, upon what indications did the builder base his conclusion that the architect did not intend the roof to reach the wall? That there must have been some indication, and that a "clear" and unmistakable one, to justify the builder in going on, without asking the architect for explanations, and making the roof improperly, is well settled in the courts, which consistently hold that a builder who signs a contract thereby warrants that he understands the plans to which the contract relates. His contract, moreover, is not blindly to carry out plans, but to erect the building which the plans are intended to represent. He is obliged to use his skill and judgment in the interpretation of the drawings; he must do, under his agreement, work, not shown on the plans, which may be necessary for carrying out the building which forms the subject of his contract in such a manner as would be inferred from a study of the drawings of other portions of the work; and the law obliges him, if he discovers, or might, with due attention, discover, inconsistencies, obscurities or oversights in the drawings and specifications, to apply to the architect for explanations or corrections before carrying them out. If the builder of the armory had done this, it is hardly conceivable that any such glaring blunder should have been committed as that for which Mr. Thomas was so coolly fined; and if he did not do it, the cost of making the blunder good should be paid by him, not by the architect.

A WRITER in the Brooklyn *Review and Record* makes a rather alarming suggestion in regard to the effect of the Chicago Fair upon our architecture. After saying, like every one else, that the Exhibition Buildings constitute, perhaps, as a mere spectacular creation, the greatest achievement of architecture that the world has seen, he infers that they will have, upon a people so impressionable as ours, a lasting effect, but he doubts whether the effect will be altogether advantageous. To be impressed by a piece of architecture is one thing, but to succeed in imitating it is another, and, as imitation is sure to be the way in which the carpenters and pretended architects will show their admiring recollection of the White City, we must probably make up our minds to a reign of "peristyles," engine-houses designed in imitation of the Administration Building, and so on. The *Review* thinks that the Renaissance of the Fair buildings lends itself more readily than other styles to vulgarity and ostentation, and that, on this account, the approaching age, which we may, perhaps, call the White City epoch, is likely to be particularly prolific of "artistic crimes"; but it is to be remembered that, if any artistic sin is possible which has not yet been perpetrated in the Renaissance style, it would take a more ingenious bad taste than is possessed by our builders to invent it, and, while the White City has undoubtedly given models capable of inartistic imitation, it has also done much to cultivate the taste of our community to a point which would render it capable of discerning and rejecting a bad design; and, as people cannot be prevented from making ugly things, if they choose, the more the public taste is improved, the less chance there will be for the bad designers to get their evil intentions carried out.

MR. FORD MADOX BROWN, a painter very distinguished for his success in working in connection with architecture, died a few days ago in London, at the age of seventy-two. Mr. Brown was by birth a Frenchman, having been born in Calais, but was English in all his relations, and spent most of his life in England. He exhibited many successful pictures at various times in England, and on the completion of the Manchester Town-hall was engaged to paint a series of frescoes on English historical subjects. These frescoes, which have been often illustrated, occupied him for many years, and will form an enduring monument to his reputation. In 1887, the year of the Queen's Jubilee, he painted eight enormous canvases, each thirty-five feet long, representing the industries of Lancashire, to decorate the spandrels of the dome of the Jubilee Exhibition Building. The gift of painting successfully for the decoration of buildings is rather a rare one, and English architects will have difficulty in finding an artist who can take his place.

THE editor of the *Deutsche Bauzeitung*, among his observations on his journey to Chicago, remarks upon the American practice of providing locomotives with bells, to be rung whenever the machine is started. As thousands of highway grade-crossings have no protection beyond a board, requesting the public to "look out for the engine," he thinks that the bells are useful, and perhaps necessary, in passing through the country districts; and even in city stations, where much more liberty is given in the way of crossing tracks than would be permitted in Europe, he thinks it may be necessary to use them; but the result, whether inevitable or not, is to fill the great railway-stations with what he calls a tormenting, and at last unendurable, noise of clanging bells. In other respects, he finds the American locomotives admirable, their thoughtful, ingenious design being no more remarkable than their precision of workmanship and perfection of movement. That this compliment is deserved, no one will doubt, but a

much severer criticism of the noisy and careless management of our great railway-stations might have been justly made. As to our principal terminal stations, although they are far inferior to those of European towns, it may at least be said that they are improving, but most of the great way-stations, like those of Cleveland and Buffalo, are a disgrace to American railroading. To one who, after a few months' experience in Europe, where the large way-stations have handsome staircases, by which, the passenger is conducted to the various platforms, without even being required or allowed to cross the tracks, and where uniformed officials are ready at every step to direct him to his train, to give him notice of the number of minutes remaining before starting-time, and to find a seat for him in the cars, is turned loose, let us say at night in the Cleveland station, and left to thread his way, amid a deafening clamor of bells, and rumbling of shifting trains, across almost innumerable tracks, and in and out among cars just ready to start, if not actually in motion, to find the particular sleeping-car for which he has a ticket, the words which occur as suitable to the circumstances are not complimentary.

THE dangers and annoyances of such stations would, however, be lessened if the terrific noise which the German editor writes of could be abated. No doubt, it is necessary to warn people who are crossing the track in front of a moving train, if the arrangement of the station requires passengers to do so, but this could be done just as well without the continual clanging of huge bells, which, as every one has observed, is often kept up, apparently for the amusement of the fireman, long after the locomotive carrying the bell has come to a stop. There is a story of a little girl, piously brought up, who came to New York with her mother. They reached the city in the evening, and as they walked up the platform in the Grand Central Station, amid the shouts of the hackmen, the clamor of the locomotive bells, the flaring of the gas-lights, the roar of escaping steam, and the confusion of voices, the child, terror-stricken, said to her mother, "Mamma, is this Hell?" Even without the bells, the noise made in an American station in a day would last a French one, or, still more, an English one, for a month. An English locomotive, for example, runs into a station in almost perfect silence. The wheels make, necessarily, some sound, even on the smooth, well ballasted and graded track, but beyond this there is no noise, and it is as easy to talk to a guard, or a cabman, in the Charing Cross or Euston Square station as it would be on the sidewalk. In an American station, on the contrary, the advent of a train is heralded from a distance of a quarter of a mile or so by the pounding of its huge bell. It clatters into the station, and, as the reversing lever is pulled to bring it into a stop, the safety-valve flies open, with a hissing roar that drowns all conversation in the neighborhood. Even outside the stations, the American railway-service appears to be designed to make as much noise as possible. The rattling and thundering of the trains is, we suppose, incident to the greater weight of the cars, and the smaller diameter of the wheels, so that it would be impossible to imitate here the smooth, quiet movement of an English train; but it is not impossible to suppress the other noises. To say nothing of the big bell, which is often rung continuously on every locomotive through the whole of its passage through a thickly-settled town, and the opening of the safety-valve at every check to the speed of the train, our engineers apparently take pleasure in adding a distracting whistling to the other uproar. We have ourselves heard an American locomotive whistle at a distance of fifteen miles, and it may be imagined that performances on this instrument do not add to the satisfaction of residents on the line of a railway, however, they may delight the fireman and his friends. In plain truth, they are an intolerable nuisance, and should be forbidden by law except in cases of absolute necessity. If the unnecessary whistling could be suppressed, there might be hope that the unnecessary bell-ringing might also be done away with, and then might follow the invention of a comparatively noiseless safety-valve. Even then, we should be far from having reached the quiet of English railway operation, but, at least, some relief would have been given to the public nerves.

TWENTY years ago, or even less, there was a panic in the public mind on the subject of poisoning by water drawn through lead pipes. Terrible were the stories related of the sufferings of persons who had drunk water from lead pipes, and in whom the metal had "accumulated," to use the expression of the day, and in all well-regulated houses block-tin pipes, or at least tin-lined pipes, were employed to convey the water used for drinking. At that time, there was more reason for anxiety on this point than there is now, as it was common to supply houses from a tank in the upper story, itself supplied by a "rising main" and ball-cock, and the drinking-water stood much longer in the pipes than it does in modern houses, where it is drawn directly from the pressure; but careful investigation showed that, although rain-water would attack lead, ordinary spring or lake waters, such as most houses are supplied with, contain in solution carbonic acid, which acts immediately on the lead, covering it with a skin of carbonate of lead, which is insoluble and impervious, and protects the interior of the pipes from further action. So it came about that lead poisoning, which had succeeded the ferocious jute-bug as the most popular enemy of the human race, fell out of fashion, and was itself succeeded by "heart failure." The reign of this dread complaint continued for several years, until investigations into the nature of bacteria explained, or were supposed to explain, the origin of a great number of diseases, and, from that time until now, doctors, sanitarians, architects and the public have been dodging microbes as diligently as our grandfathers and grandmothers used to avoid "fits," or as their grandparents fled from witchcraft, or the evil eye. We are far from saying that the great science of bacteriology has anything in common with the ignorant dishonesty which concealed itself behind the names of "heart failure," or "fits"; on the contrary, the intelligent study of germs and ferments bids fair to extirpate, before many years, most, if not all, the contagious diseases from which the race has so long suffered; but history would fail to repeat itself if some fashionable bugbear did not appear before long to supersede the microbes. A suspicion of what this bugbear may be can, perhaps, be gathered from some articles which have recently appeared in the foreign scientific journals. It seems that a distinguished botanist who died recently, Dr. von Naegeli, discovered that microscopic plants were extremely sensitive to the presence of any metal in the water in which they lived; so that the filaments of one species, the spirogyra, died, or were kept alive with difficulty, in water containing one billionth part of copper. As this would be at the rate of one ounce of the metal in a cube of water a hundred feet each way, it will be seen that the spirogyra must be sensitive to copper, and this observation raised the question whether human beings might not be more sensitive to it than had been previously supposed. Further investigation has shown that a solution of one part of copper in twelve millions of water forms a liquid which is fatal to young children, and it seems to be not impossible that enough of the metal might be taken up by water drawn through brass fittings, or, still more, through brass pipes, to be injurious to persons drinking it. This question, which is an important one, has been taken up by certain scientific men, and the answer to it will be of much interest.

WE have received from Mr. Samuel A. Tuska an interesting pamphlet describing a sort of coking-oven, arranged according to the Simon-Carvès system to utilize the volatile products of the process, in very much the same way as the German ovens, of which we spoke a few weeks ago. The Simon-Carvès ovens are, it seems, in extensive use in France and England, and the statistics given of the saving in cost of coke obtained by their means agree substantially with those claimed for the German ovens. It is singular that in this country, which is now very nearly, if not quite, the largest producer of iron in the world, no improved coking ovens of any sort appear to be in use, yet, according to Mr. Tuska, the Simon-Carvès ovens, with average coal, will save nearly their cost in a single year. A point which Mr. Tuska makes is worth remembering. Every one knows that our city gas-companies are getting more and more into the way of supplying water-gas, in place of coal-gas. In the manufacture of water-gas no ammonia or tar is collected. Both these substances are indispensable for many purposes, and the home supply is so limited that large amounts are imported from Europe. By the new coking processes, the ammonia and tar, which were formerly wasted, are saved, so that, if they could be introduced here, the incidental products would find a particularly steady and profitable market.

THE BURGUNDIAN SCHOOL OF ARCHITECTURE.[1] — II.

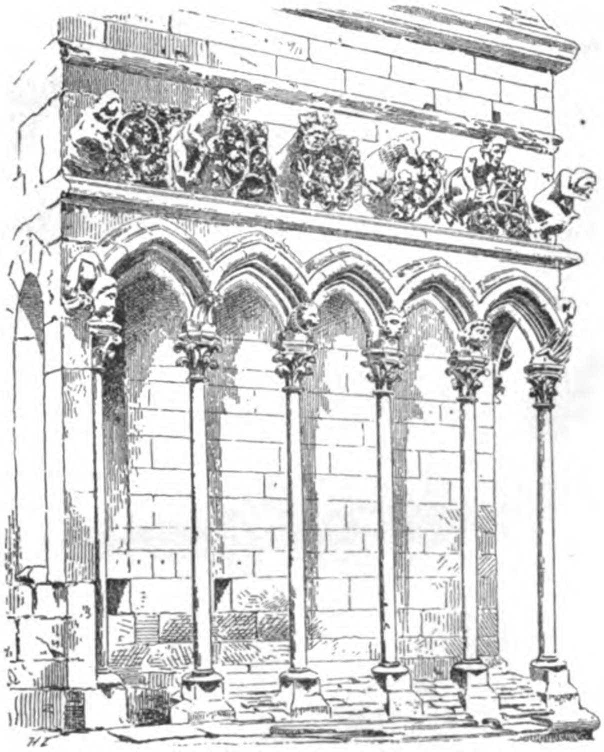


Fig. 8. Cornice from the Towers of Notre-Dame of Dijon.

THE Burgundian school not only distinguished itself in the thirteenth century in the general design of the edifice, but also in the various details; thus, for example, Burgundian bases and capitals are generally of elongated section, while in certain other centres they are square, or nearly so; and the sculpture of the capitals, in which crockets play an important part, assumes thenceforth a peculiar aspect in the matter of grouping. A wholly individual character appears likewise in the disposition of Burgundian cornices, which are formed by means of corbels connected by shoulders joining them to the main mass (Fig. 8).

The civil architecture of this province is also most interesting to the student; of the twelfth century, for example, should be cited the houses of Cluny, nearly all of which have, unfortunately, disappeared; but sketches of the remains that existed thirty years ago will be found collected and reproduced in the work of MM. Verdier and Cattois. Among the well-preserved constructions of the Gothic period, we note particularly the house at Dijon known as the "Hôtel des Ambassadeurs d'Angleterre"; it dates from the fourteenth century. The court is in a good state of preservation, with its angle stairway, the open-work spirals of which exhibit a very ingenious and picturesque construction; the disposition of the windows very happily combined in the dormers is especially remarkable, as shown in Figure 9.

Fig. 9. Dormer-window from the Court of the Hôtel des Ambassadeurs, Dijon.

Fig. 12. From Saint-Michel, Dijon.

[1] From the French of A. de Baudot, in Planat's *Encyclopédie de l'Architecture et de la Construction.* Continued from No. 929, page 16.

At the close of the fifteenth century and during the sixteenth, Burgundy, while maintaining its own characteristics, was subjected in the architectural forms to influences of divers kinds, and notably to the influence of Flemish art; it is to this period that the famous Well of Moses at Dijon belongs, a very beautiful cast of which (Fig. 10) may be seen in the Museum of the Trocadéro. The Church of Saint-Michel, at Dijon, is of the sixteenth century. Interesting sculptural motives are found here (Figs. 11, 12). From this time, the sculpturing spread over structures was made to project quite prominently, comparatively speaking, as in the north; but it, nevertheless, preserved a local character which is not without its charm. As to the architecture itself, it remained Burgundian, and we can always perceive in it traces of mediæval traditions, as well as the influence of the peculiar materials used.

Fig. 10. The Well of Moses, Dijon.

The various departments now included in Burgundy still possess a number of castles, mansions and edifices of all sorts, some more remarkable than others; but it is at Dijon that those most interesting to the student are found. We will call attention especially to the court of the Hôtel Sully, the contruction of which is based on the use of columns cut contrary o the cleaving grain and of monolithic lintels, which the

Fig. 11. From the Church of Saint-Michel, at Dijon.

architect turned to good account for decorative purposes (Fig. 13); also to the Palais de Justice the porch of which, surmounted by a stone dome, is of uncommon interest because

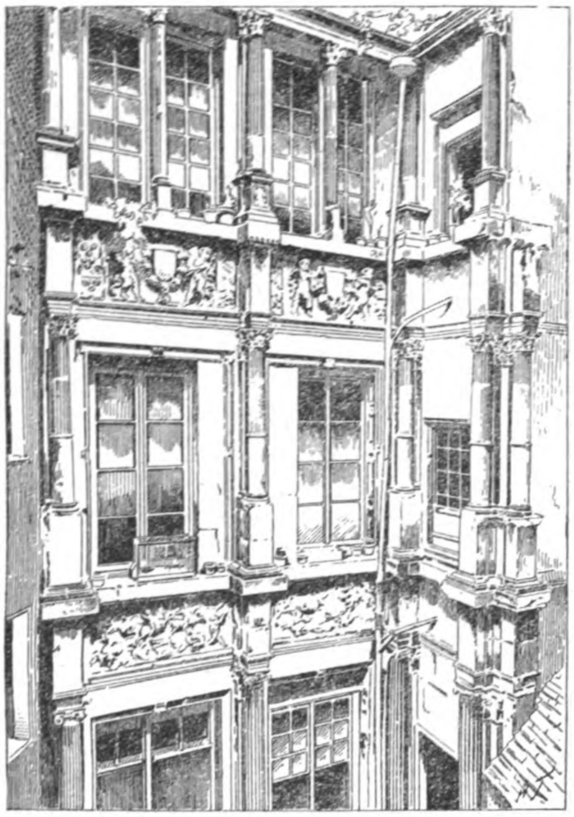


Fig. 13. Court of the Hôtel Sully, Dijon.

of the intelligent fashion in which the columns adorning the door are made to reënforce the angle piers, the latter being too slender to resist the thrust without this opportune aid

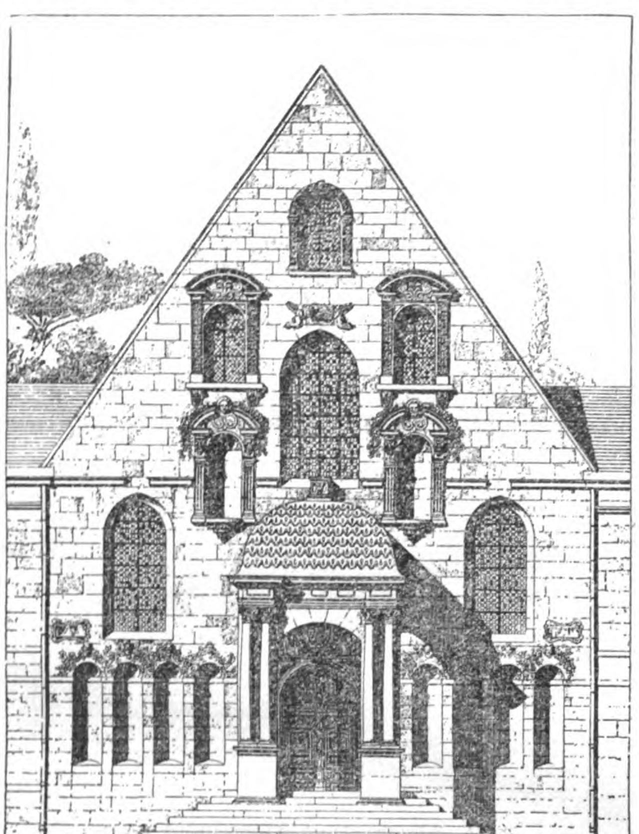


Fig. 14. Palais de Justice, Dijon.

(Fig. 14); and lastly to the curious façade of a house in the Rue des Forges, most lavishly embellished, but with very interesting architectonic dispositions and details of mouldings. Here, too, the reasoning of the builder is apparent, who attempted, above the lintels of the bays, to indicate discharging arches, the decoration of which is skilfully interwoven with the sculpture (Fig. 15). At every step in the progress of the school the same kind of effort is observable,

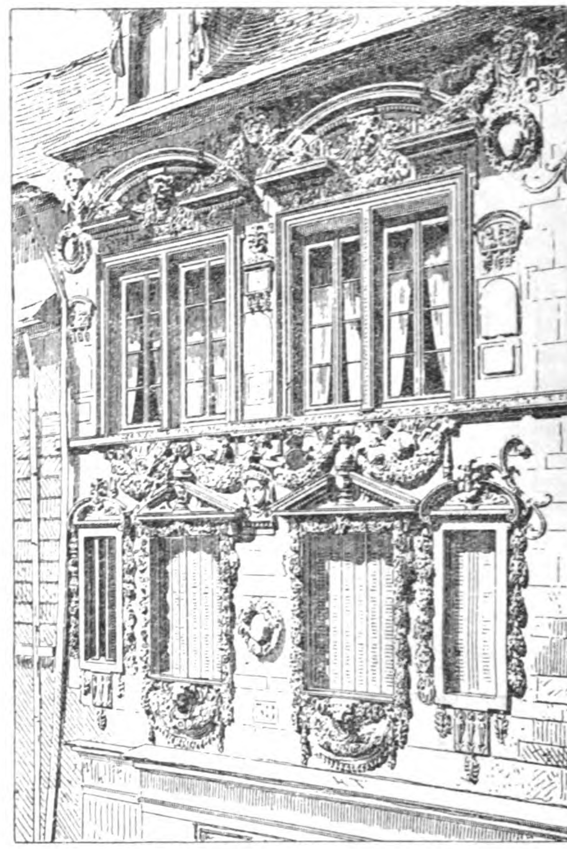


Fig. 15. House in the Rue des Forges, Dijon.

the desire to ally form and structure which constitutes the fundamental characteristic of all mediæval architecture, but particularly in Burgundy, where this inspiring principle continued to be applied down to the eighteenth century.

A. de Baudot.

THE GREAT EXHIBITION REVIEWED.[1]—III.

ITS VISTAS AND LANDSCAPE EFFECTS.

We are standing on the floor of the Colonnade. Our backs are to the Stock Pavilion. On this level we can walk from the gallery of the Agriculture Building to the gallery of the Machinery Building without descending to the ground. Immediately in front of us stands the Exposition Monument. In all the accounts and descriptions that have been written, this has seldom been mentioned. Its site has by some been called the "neglected corner." It is only neglected because it is not a thoroughfare. When the park is crowded but few persons may be met on this gallery and few are seen about the monument, but the concrete steps that surround it are resting-places for the weary who are always sufficient in number, to give scale to it. The monument is the design of Peabody & Stearns of Boston. It is of temporary materials but is worthy to stand until it can be replaced by a permanent structure, as it is admirably located for the purpose in view of the canals being retained as part of the ultimate design of Jackson Park. The base is of concrete in five steps rising from the lower terrace at the south end of the canal. Here the boundary of the canal curves outward into the water. The steps form angle-buttresses, which are surmounted by four lions cast in concrete from a model by M. A. Waagen, who also designed the colossal groups that surmount the pavilions of the colonnade between Agriculture and Machinery Buildings. These lions somewhat resemble those modelled by Sir Edwin Landseer for the Nelson Monument in Trafalgar Square, London. Between the buttresses on the four sides of the monument are four basins for fountains which are sunk below the floor of the lower terrace. They are built in concrete as also is the esplanade that surrounds them, but unfortunately have never been supplied with water. Back of the lions rises the square die of the monument, having truncated angles against which are Greek scroll consoles, and these are connected together by festal garlands. On the four sides

[1] Continued from No. 929, page 23.

of the die is the following inscription in the English, Latin, Russian and Chinese languages:

FOUR HUNDRED YEARS
AFTER THE DISCOVERY
OF THIS CONTINENT BY
CHRISTOPHER COLUMBUS
THE NATIONS OF THE WORLD
UNITE ON THIS SPOT TO
COMPARE IN FRIENDLY EMU-
LATION THEIR ACHIEVEMENTS
IN ART, SCIENCE, MANUFAC-
TURES AND AGRICULTURE.

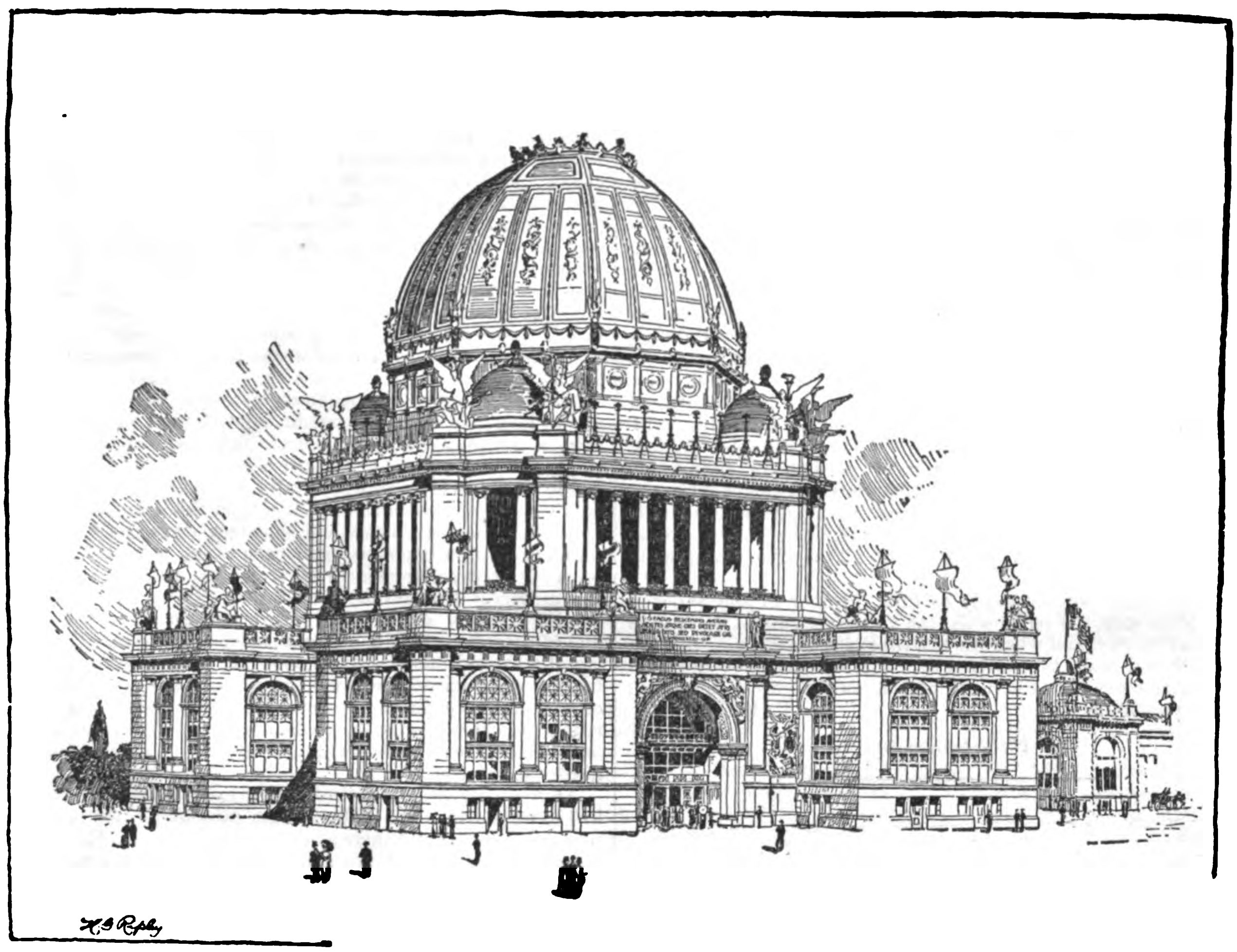
Surmounting the die is an octagonal cornice carrying on the four shortest sides eagles resting on globes, and garlands are hung between the eagles. Above this rises the obelisk, with Egyptian proportions, to a height of more than one hundred feet, surmounted by a finial and ball. This with the die, eagles and consoles is of staff on a framework of wood, and painted white.

The monument was the last piece of work done by the Exhibition builders and was not completed[1] until June. As a treatment of the obelisk feature it is more successful in its proportions than any of the Egyptian obelisks that have been set up in Europe on modern pedestals. Should it ever be made permanent, there are more quarries than one in America that can produce a monolith of equal size. On the four sides of this it would be possible to inscribe a brief but enduring history of the undertaking that is now about to be closed forever.

From the gallery where we stand is unfolded the grandest of all the vistas in the Exhibition, the Grand Court not even excepted; for it reveals just enough of the latter to suggest what it may be and prepare us for the revelation of another panorama. From this point we have an unbroken view of exactly three-quarters of a mile. For at that distance is seen the dome of the much-abused Illinois Building, over the trees of the Wooded Island. At the risk of a hackneyed phrase it may truly be said that here "distance lends enchantment to the view," as far as this building is concerned, and its critics can at least be contented with it as serving a useful purpose in contributing to some of the landscape effects. There is no other view in the park so extensive and none so long, not even on the cove of the lake front. From a position on the east side, we see in perspective on the left the entire fronts of the Machinery and Electricity Buildings, between which are the McMonnies and electric fountains; in the foreground the canal with its three bridges, the lagoon and, beyond the Wooded Island, part of the Woman's Building and the red dome of the California Building in the extreme distance. Walking westward the scene slowly changes, and from near the Machinery Building we see the Agriculture Building to the right, and across the basin, the Manufactures Building on its longest side, facing both the North Canal and the lagoon. Beyond this is the west pavilion of the Fisheries and the Marine Café with its brown turrets and in the extreme distance a glimpse of the Art Building. In each view the Illinois dome is the most prominent distant object, and is the resting-place for the eye at the end of the perspective.

It is a long walk from this to the next point of observation, and yet we pass only two buildings to reach it. We traverse the lower terrace east of Machinery Hall, then cross the Grand Court west of the fountains, breasting our way always through dense crowds, and as we reach the east side of the Electricity Building we are again uninterrupted, for here in the very heart of the exhibition we come to an unfrequented walk. We take the upper terrace with Electricity on the left and the South Canal on the right. Here may be seen more boats than in any other place for they all pass through it both ways. The crowds are on the opposite side of the canal around the restaurants under the loggia of the Manufactures Building. Here, also, it is shady in the afternoon and the grass on the terraces is always fresh and green. But reaching the end of the walk and turning to the right we are in the throng again and on the bridge over which passes nearly all the travel from Transportation, Illinois and Electricity Buildings to the Manufactures Building. Here we may look backward to the Colonnade, and find that the perspective is all architectural, bordering the waters of the canal which is fringed with green grass and white balustrades, on both sides. Two bridges cross the line of vision through which we see passing the interminable procession of gondolas, launches, and sometimes strange craft from Ceylon, Japan or the Bosphorus.

This bridge is at the dividing line between the formal and picturesque portions of the park. For, turning to the north we see not only the distant part of our last view, but the whole lagoon and Wooded Island, the Transportation Building to the left, the Choral



The Administration Building, R. M. Hunt, Architect.

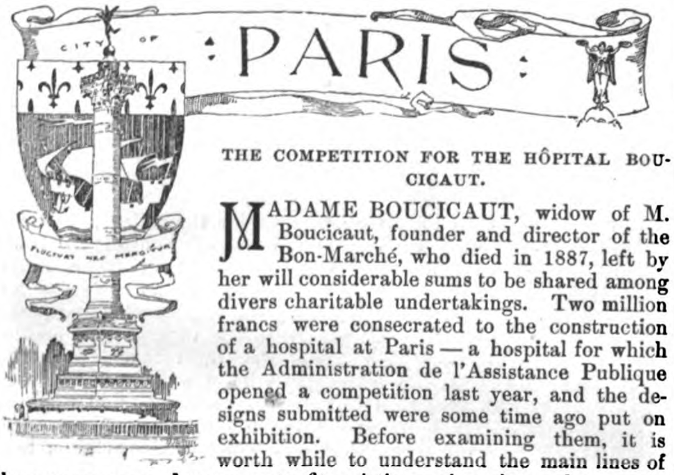
[1] This is an imperfect statement, for the reason that this monument is not yet completed. In order that visitors might not longer be annoyed by workmen and to cut down operating expenses, the authorities had, at last, to order that all work should stop on a fixed day. When this day came the Exhibition Monument still lacked four figures, each twelve feet high, modelled by Messrs. Evans and Bachmann, which were to stand in front of the flanking consoles, and also the nude boys astride dolphins which were to be placed below each inscribed panel in the centre of the big festoons were omitted. As the water for the basins was to issue from these dolphins' mouths, the present effect is hardly what the designers intended it should be. — Eds.

Hall and such parts of the Horticulture Building as are visible above the trees of the island. On the right, the terrace along the north-half of Manufactures Building changes to a single revetment and balustrade only. For the lower terrace is substituted a sloping bank covered with green shrubs and aquatic plants. This building is so long that its north-half invades the picturesque quarter; the landscape architects have, therefore, given the shore of the lagoon a transitional character. This is also carried out in front of the Transportation Building. But north of Manufactures Building the shores have a natural treatment except where landing-places for the boats are required. The view now brings out more definitely what was only a mystery as seen from the Colonnade. Directly in the centre is the Japanese bridge, with the Wooded Island to the left. The whole of the Illinois Building comes into prominence above the trees still half a mile distant, with the white Greek Temple of the Merchant Tailors in front of it and reflected in the water. The Fisheries Building is to the right, backed by the brown Café Marine, while the domes of the Art Palace and California Building and the Gothic towers of the Indiana Building are seen in the extreme distance. This is the most comprehensive of all the views in the park and reveals the vast extent of the exhibition better than any other.

Turning to the left it is but a short walk along the north side of the Electricity Building to the bridges which take us to the Wooded Island. There are two of them. The first lands us on Hunter's Island, where is located the Hunter's Camp and its log house, which was the gift of Theodore Roosevelt, and from this we reach the Wooded Island over another bridge. We will stop on the first bridge. From this there are four famous architectural views. To the west there is the best view of the "Golden Gate" to the Transportation Building, with the terrace, the sloping bank and the waters of the lagoon in the foreground. During the quiet days of summer a Venetian two-masted fishing-boat was anchored here with its red and gold sails set, and making a beautiful picture. Turning a little to the south we see the best perspective of the great north door of the Mines Building, with a similar foreground. To the south is a view wholly architectural, which suggests a street-scene, the only one on the grounds. It has frequently been photographed. It shows Mines to the right, Electricity to the left and the Administration Building seen in elevation at the end of the street. There is nothing here to suggest the rurality of the surroundings. We turn next to the east and find that the centre of this bridge is on the axis which passes perpendicularly through the centre of the Transportation Building on the west and Manufactures Building on the east, and we have a direct front view of the central pavilion of the latter. But the best view is from the next bridge, so we cross over the Hunter's Island and face to the right on the centre of this bridge. Here the architectural details and great proportions of Manufactures Building come fully into view. We see the great pavilion in perspective across the water and the bridge of three arches over the canal to the right, forming one composition. At intervals along the balustrade on the south end of the lagoon and on the bridge piers the vigorously modelled wild beasts of Kemeys, come into all the views and greatly assist the foreground effects.

From this point we are ready to take the tour of the Wooded Island. Following the outer walk, the views are almost endless in number and variety, and when the eye tires of them the most delightful rest is found amid the shady walks that surround the Japanese Palace at the north end, where we can sit on the garden seats and watch the passing throng. P. B. WIGHT.

[To be continued.]



THE COMPETITION FOR THE HÔPITAL BOUCICAUT.

MADAME BOUCICAUT, widow of M. Boucicaut, founder and director of the Bon-Marché, who died in 1887, left by her will considerable sums to be shared among divers charitable undertakings. Two million francs were consecrated to the construction of a hospital at Paris — a hospital for which the Administration de l'Assistance Publique opened a competition last year, and the designs submitted were some time ago put on exhibition. Before examining them, it is worth while to understand the main lines of the programme, drawn up to fit existing exigencies and so as to comply with all the modern laws of hygiene and take advantage of the progress made by science. The hospital had to be arranged for one hundred and twelve beds, sixty-four for sick cases and forty-eight for surgical cases. Besides, there were to be provided twenty-four beds for confinement cases, eight for doubtful cases, and six for the employés of the Bon Marché. This gives a total of one hundred and fifty beds to be provided for on a site occupying 23,170 square metres. The services which had to be provided for in different structures comprised nine different divisions: First, the medical service; second, the chambers for the employés of the Bon Marché; third, the surgical division; fourth, the building for accouchement cases; fifth, the pharmacy, linen-room, kitchen, common rooms and chapel; sixth, the administrative buildings and consulting-rooms; seventh, laundry; eighth, heating-apparatus, clothing-shop and store-rooms for foul linen; ninth, operating amphitheatre and dead-house.

The medical service, consisting of one or two pavilions, must contain forty beds for males and twenty-four for females, with two isolated chambers for each sex. In case a single pavilion should be used for the medical service, the building must be arranged so that the sick men could never encounter the sick women. One uncommon point, and one which denotes the constant prevision of the laws of hygiene: the height of the wards had to be at least four metres, the width nine metres, without intermediate points of support. Each bed had to occupy a space between windows, which must reach to the ceiling, and be divided into three parts, so that each could be opened independently of the others. The floors must be of stone, so as to endure daily scrubbing. The walls, as well as the ceilings, must be painted and varnished, all the angles rounded, and without mouldings or cornices. Each ward must contain an open fireplace, but the heating must be provided for by hot-water apparatus. A vestibule, of course, must be attached to each ward.

Finally, attached to each service, must be found the isolated chambers, with a room for the watcher, a bath-room containing a fixed bath, and one mounted on wheels, an office with stove, a little linen-closet, heated water-closets entirely separated from the wards by double doors, lavatories and dining-room, and a separate room and office for the head-nurse and a storeroom. The surgical ward must be arranged under analogous conditions, and must be removed from the medical ward as far as possible. It must contain thirty beds for men and eighteen for women, and consist of a ground-floor raised above the cellar, while the medical pavilions could, under necessity, have two stories. Moreover, the surgical ward must contain a division for those whose wounds or diseases are infectious, containing fourteen beds, and a room containing eight beds for women in the same category; also two similar rooms for non-infectious cases, two operating-rooms, one for infectious cases and the other for non-infectious, which are to be common to the male and the female pavilions, but so placed as to entirely separate the male from the female wards, which, notwithstanding, still remain neighbors to one another.

The operating-rooms must be six metres in length by five in width, and at least four metres in height, lighted from above and from one side, and facing north-northeast. The floor must be of Cesame stone, and the walls must be covered with tile to their full height. These rooms must be provided with hot and cold water, sterilized. In a neighboring room must be arranged the linen-heater, sterilizing apparatus, the instruments and bandages, the water-heater, the ventilator, etc. Each operating-room must be preceded by a smaller room of twelve square metres, where chloroform can be administered if necessary. A maternity hospital must be arranged for eighteen women recently delivered, two women *enceintes*, and two cases under inspection. Built above a ventilated basement, and consisting of a ground story and one above, it must provide for a service for the eighteen confined women, a room for the four women *enceintes*, an accouchement-room, an operating-room, a consulting-room, two chambers for the women under examination, and, finally, bedrooms for the midwives, the head-nurse, six convalescents, two nurses and a steward.

All these services, described with great fulness in the programme, had to be provided for with extreme care in the matter of orientation of the wards and their hygienic distribution. The general services, the pharmacy, the linen-room, the common rooms and kitchen might be grouped in a single building placed in the centre of the hospital. This building might consist of basement, ground-floor, second story and attic, except above the kitchen. The administration building must be placed on one of the street-fronts. It must consist of basement, ground-floor, second story and attic. On the ground-floor must be placed the consulting-rooms for physician and surgeon, with their numerous annexes, waiting-rooms, examining-rooms, disinfecting-room, clothes-room, medicine-closets, dentist's office, etc.; also the office of the director, the apartment of the *concierge*, the rooms of the medical and surgical internes, the library for the patients and the water-closets; upon the first floor must be the apartment for the director and one for the apothecary, and the rooms for the servants.

As for the general arrangement, the establishment must be closed on the street-fronts by solid walls to the level of the window-sills, and above this by windows closed with shutters. Lighting must be by electricity, the heating by hot water; each department must be furnished with filtered water, provided by the best apparatus. Here, evidently, it is intended to apply the system of "everything to the sewer." The attendants must be provided for, either in the buildings devoted to the patients, or in the buildings devoted to the general services, or in special pavilions.

This well-defined programme will allow us to take account of the arrangement adopted by the competitors, whose schemes [See

illustrations] we are going to study. The site, situated at Grenelle, is bounded by three streets: Rue des Cévennes, Rue de Lourmel and the Rue de Vouillé. This last, the widest, was adopted by the greater number of the competitors for the main façade and entrance, which was thus placed on one of the short ends of the parallelogram. To the right lies a block of houses to rent.

Forty-three competitors took part in the competition, which resulted in very interesting studies and very complete ones. Nevertheless, the first prize, which amounted to six thousand francs, was not awarded. Two second prizes, each of 4,000 francs, were granted to MM. Alfonse and G. Le Gros placed first, and M. Michelin. Three prizes of 2,000 francs each were given to MM. Courtois-Suffit, Plancq and F. Calinaud. Actually, the first prize of 6,000 francs was divided into three supplementary prizes, awarded, rightly or wrongly, to three designs which were deemed to deserve some recognition. The project of the Messrs. Le Gros presents really good qualities and ought to have been placed in the first rank. The principal approach to the establishment was chosen on the Rue de Vouillé as being the broadest street. The administration building occupies the centre of the building on the street, and consists of one story with an entresol which serves to separate the apartments from the rooms devoted to the sick. Right and left, consisting of a single story only, are the pavilions of consultation and observation. In the basements, lighted and ventilated through English courts, are placed the bath-rooms. It is through the basement, by means of galleries, that is effected the communication with the several pavilions which are not connected by any corridor but are completely isolated one from another. At the right of the main longitudinal axis is found the medical department, at the left the surgical. Each of these two departments is in itself divided into four distinct parts. The men's portion consists of two pavilions, each containing the eighteen beds required by the programme, while the women's department equally consists of two pavilions each containing ten beds. The surgical division is arranged in the same way. Two operating-rooms, one for infected and the other for non-infected patients, are separated from the pavilions by galleries, which allow of the transportation of the wounded. The sick-wards occupy the end of each pavilion, and consist of only a single story. The chambers for the sick are placed in the second story, which extends only over the dining-room, wash-room, linen-room and access to these is made easy by an elevator. The pavilion of the Bon Marché, which is considered rather as quarters for convalescents, occupies the central portion of the group. It takes advantage of the space left free by the pavilions which surround it, and which, with the exception of the maternity-ward, consist only of a ground-floor. It is surrounded by the gardens, and is two stories in height. The maternity hospital, which forms a complete and independent division, has been placed at the angle of the two streets, and the pavilion for women under surveillance is entirely isolated. On the other side, against the party-wall, are found the dead-house, as far removed as possible from the sick-wards, the laundry and the little chapel. These services are grouped about a special court-yard, which has a distinct and independent exit to the street. Finally the general services, kitchen, linen-rooms, pharmacy and common rooms, are grouped in one building having direct approach from the street at a central point behind the pavilion of the Bon Marché. Galleries arranged in the basement furnish communication with all the other pavilions.

We find fault with the Messrs. Le Gros for having placed their water-closets too much in the centre of the sick-wards. They should have been in places more remote from the wards. Moreover, the general services might have been placed a little more in the foreground and not forced so far to the background. However, this plan has the advantage of being very well ventilated, while giving satisfaction to the principal demands of the programme.

M. Michelin's scheme is also very well studied; but he has committed rather a grave error in having followed the letter of the programme, which allows the division of the surgical pavilion into two stories. M. Michelin answers this complaint by pointing out that the men's ward, being placed on the ground-floor and the female ward above, allows the surgeon to have both male and female wards under the same roof. Having made this observation, let us examine the general structure of his scheme. Entrance is had from the Rue de Vouillé into a wide vestibule, at right and left of which are the administration building and its dependencies, the lodge of the *concierge* and the guard-room. At right and left of this building, to which they are connected by galleries, are the consultation pavilions, with private entrances from the public street. This arrangement is excellent. Galleries connect with the general medical and surgical services, which are arranged in a manner analogous to that followed by the Messrs. Le Gros; but here, notwithstanding, the sick-wards are completely isolated from their water-closets and accessory service, with which they are connected only by galleries. This adaptation of the theory of isolation to a sick-ward is very well devised; but in the present case it compelled the architect to superpose, as I said above, one ward upon another. The jury did not allow themselves to be greatly influenced by this consideration, and were evidently captivated by the absolute isolation of the sick-wards. The remainder of the plan can be readily interpreted from the cut. At the rear, on the left, is the maternity-ward, forming a little isolated establishment. In the centre are the general services, and on the right the dead-house, laundry, etc. Wide paths, adapted to wagons, cut the plan in an ingenious manner, and separate the different departments.

M. Courtois-Suffit has been placed third, with a plan which is very remarkable from the point-of-view of mere study and architectural arrangement. It is the sort of thing which we in Paris call "*un plan de grand prix*," composed with an attention to style which accentuates an edifice of prime importance. Unfortunately, it has the faults of its good qualities, and it answers in a too grandiose manner the end which it was designed to serve. The porticos, which encircle a grand central court-yard, are too monumental, and do not sufficiently isolate the pavilions which they actually connect.

Upon the annexed cuts can be followed the main lines of the *parti* adopted by M. Courtois-Suffit. Here it is seen that the sick-wards are situated in the second story, but the ground-floor is only occupied by exercising grounds, widely opened, where the convalescents can take their exercise under shelter. The operating-rooms, which occupy the centre of each surgical pavilion, are, perhaps, not sufficiently ventilated, but the general arrangement of these pavilions is extremely happy, and might be used in a satisfactory manner by bringing forward the operating-room. The general services are very well placed at the centre of the buildings. The pavilion of the Bon Marché, which the greater part of the competitors believed ought to be placed in the centre, and on the axis of the administration-building, would have occupied a more agreeable site on the street, forming, as it were, a little private annex surrounded by a garden. M. Boileau, *fils*, architect of the Bon Marché, thus understood it. But his scheme, although very well studied, has only been ranked in the seventh place. M. Courtois-Suffit had the excellent inspiration of separating his buildings as much as possible from the neighboring party-wall, alongside of which he arranged a broad alley. The façades were also very well studied, but were treated with too great richness, and it was through his seeking too grandiose effects that M. Courtois-Suffit only obtained the third place.

M. Guenot had a plan unfortunately encumbered and lacking air, and received no award; but the detail of his pavilions was studied with care. He adopted a scheme analogous to that of M. Courtois-Suffit. His halls, as may be seen by the annexed cut, are raised above a kind of open recreation-ground, which allows the circulation of air below the floors. The currents of warm air established in this floor prevent the entrance of cold, which might otherwise enter because of this arrangement. The hollow walls of the first story protect the hall also against cold and, as well, against heat. The water-closets are well separated from the pavilion, and the operating-room, placed, as is that of M. Courtois-Suffit, on the axis of the staircase, projects in front of the buildings, and is for this reason easily ventilated.

In the way of curiosity, I will mention the scheme of M. Héneux, who adopted a disposition which was different from those which were premiated. He placed his façade on the Rue Lourmel, which allowed him to arrange his plan breadthwise. The building forming the façade was occupied by the administration *A* and by the consulting pavilions, *B* for surgery and *C* for medicine. The pavilion of the Bon Marché was placed at *G*, in the centre of the central court. On the right are found the medical pavilions *EE'*, on the left those devoted to surgical cases, *DD* for non-infectious cases, *D'D'* for infectious cases. The maternity pavilion occupies the buildings marked *F*, having a façade on the Rue de Vouillé. Then, backed-up against the party-wall, are found the general services: kitchen *H*, chapel *I*, the laundry *K*, and the drying-rooms *L*. At the right of the general services are arranged the pharmacy, *M*, the offices *O*, the stables *P*. On the left, relegated to the Rue des Cévennes, is the mortuary.

This arrangement, adopted by only a few competitors, has not been approved by the jury. It was not, however, to be condemned absolutely. He isolated the pavilions of the middle buildings, and preserved for them a good orientation, but it had the defect of not placing the entry on the largest street, and this inconvenience was judged to be not allowable.

This important competition was only a preliminary competition, and it is likely that the competitors receiving awards may have to undergo a second trial. This seems only fair, does it not? But in France, and perhaps in other places it may be the same, public competition often gives rise to extraordinary surprises; and it would not be astonishing if the Administration de l'Assistance Publique, now that it has in its hands eight schemes, all presenting great and admirable qualities, should appoint an architect from its own body, who, by the aid of all these elements, could succeed in combining a perfect whole. As amongst the competitors premiated there was one who is officially connected with the Assistance Publique, it may at least be wished that in such a case he may be the one selected.

VAULTS OF THE BANK OF FRANCE. — The treasures of the Bank of France are said to be better guarded than those of any other bank in the world. At the close of business hours every day, when the money is put into the vaults in the cellar, masons at once wall up the doors with hydraulic mortar. Water is then turned on and kept running until the cellar is flooded. A burglar would have to work in a diving suit and break down a cement wall before he could even start to loot the vaults. When the officers arrive next morning the water is drawn off, the masonry torn down and the vaults opened. — *Exchange.*

THE ART ASSOCIATION AND ITS NEW QUARTERS IN THE HOPKINS HOUSE ON NOB HILL.

A YEAR ago, the Art Association of San Francisco occupied but modest quarters over a meat-market and grocery-store in the business part of the city; daily, from the surrounding premises, the gentle wind of heaven wafted to the nostrils of the students the aroma of fried tom-cods, steak-and-onions, and other such choice edibles as go to make life worth the living, telling them as language cannot that they, too, are of the earth earthy, born even of the soil, and that if they would go forward unto the life artistic they must follow the highways and byways of men, studying them in all, even their humblest avocations; for from these surroundings alone may they expect to draw that simplicity and beauty of thought which will make them that which they desire to become, that something which is apart from custom, propriety and convention, and which we call artistic.

All this is now changed. In our folly of follies we desired that the wealth of the millionnaire might be ours, and now, true to the saying, that "to what we aspire, that we attain," the gods have granted our request, and thus have cursed us. The art life of San Francisco was a healthy one until they began to envy the palaces of the rich: but it is passed; in an unguarded moment they have sold their birthright of cobwebs and grime and other such natural surroundings, and have received in exchange a veritable mess of pottage.

On Nob Hill stands the palace which is now theirs, but it is far from a thing of beauty, despite the hundreds of thousands required to produce it. Rather let us call it a thing of vulgarity, for from turret to foundation-stone it contains naught that is not repellent to the eye of the artist, save it may be the few feet, few and far between, which the extravagant designer has left unadorned. Such a building as this must forever rest as a great burden upon the heart and soul of a true artist, for it draws him away from nature, making him forget the blue sky and the quiet walks of life, and filling his mind with the importance of that which, above all, he should hold as worthless — material wealth.

The story of the building is in this manner: In the days when railway-kings were being created, one Mark Hopkins was chosen by the gods to be a ruler over the travel of the people, and in this control of their movements amassed great wealth, which it is said even millions could not count. Toward the close of life he builded for himself a great mansion, placing it on a hilltop, that it might see and be seen by all men.

Externally, it has been likened by those unacquainted with architectural terms, but possessing judgment, to a highly ornate box-stove, and the comparison will do. Internally, it is equally devoid of beauty, but not for lack of intent, for from the distant East were brought carvers and gilders and inlayers of rare woods, that they might adorn it from floor to ceiling with the choicest efforts of their crafts, that it might equal, if not surpass, the finest in the land; but money alone could not make it other than commonplace. Fortunately, or otherwise, the wealthy owner did not live to see the spacious halls and reception-rooms, not to speak of inferior apartments counted by the score, finished, so to the lonely widow was left the labor of superintending. Her death a year or two ago left to Mr. Searles, her second husband, with her other possessions, the great house on Nob Hill.

Few men can fill well so great a residence as that of which we speak, and Mr. Searles, not being one of these, soon found the great building becoming a burden to him, and, casting about to see how best to dispose of it, the Art Association of San Francisco was suggested as a fit object on which to expend his generosity; so to it the offer was made and finally accepted.

A private residence is never likely to be satisfactory as an art-gallery, and this building is no exception to the rule, for its walls are so pierced with openings of various sorts that but few pictures can be hung, and still fewer seen to advantage.

The building was formally opened a few months ago at the spring exhibition and a house-warming given, the art-world mustered in force and some of the other world as well, to see, be seen and "give to get esteem," as also to discuss pictures, sound, dress and light refreshments, and go away feeling happy if not elevated.

The main floor of this building is to be used for gallery purposes and although at present the Association does not possess any pictures, it hopes to accumulate in a few years a fund which will enable it to spend a thousand or two annually in purchases of works of art. The attic floor is used for studios and class-rooms for the pupils, while the intermediate floor and basement are of use only in so far as they provide vacant space in which the masters or students may wander around for rest or contemplation. An art museum may some day well fill this emptiness.

The spring show brought forth nothing remarkable or significant of budding genius in this land of the far West. As in former years there were perhaps a score of pictures that one might care to have were money no object, and as to the rest, if one has seen them once it is enough.

Mr. William Keith is still as hard a worker as ever and so long as we have him we can count upon landscapes that will interest and instruct us. This year Mr. Keith has one that is particularly satisfactory — it is of Mount Diabilo. Mr. Keith's pictures are, as a rule, cool and sombre for California and have their truth rather in the fleeting days of winter and spring than in the season of withered grass and cloudless skies that are so characteristic of this western country. In this "Mount Diabilo," however, it is summer. You are standing in the sun-cracked valley of the San Joaquin; in the middle distance a few live oaks sheltering some stacks of straw suggest cool retreats beneath their close-set foliage. From one's feet to the far distant mountain the air vibrates with the heat of summer, the grass is brown or rather straw-colored and the valley, tawny as the sea-shore, stretches outward to the far distance and becomes lost in the sloping sides and blue of the mountain. In such a picture the artist has given us room to breathe despite that the day is hot, for one feels that the world is all before him and beyond the blue mountain, drawing him to it because of the mystery of distance. Another of Mr. Keith's pictures might fitly be dedicated to the wind, to the breeze of the Pacific, that which blows lustily all day long and grows not weary. Beneath its every gust the trees bend gracefully, and the arms of the wind-mills rattle as they turn and turn again.

Mr. Matthew's picture is essentially the picture of the year, but I do not care for it very much; not that it is a poor picture but then, you know, when one tries to do something very fine and does not quite succeed, it would perhaps be as well if one had not succeeded at all. The subject is an ambitious one, for it purports to represent a picnic scene: it is summer, of course, and in the woods; thin, smooth silvery trunks of many small trees wander up, here and there and everywhere, as background. Through thin, leafy covering above the yellow sunlight spatters itself upon their many branches, and upon the brown earth beneath birds hop from earth to tree-trunk. Beneath the shade is gathered a party of young women, some standing, others sitting, about twenty in all, and all looking proper and inane. A little in advance of their companions stand the three principal figures of the picture, two, arm-in-arm, are leading their companion who loiters behind in an indifferent manner, but the lack of motive and centralization of idea, makes the picture positively wearisome to look at. When Thomas Carlyle wished, as he used to say, to produce vacuity of thought he took up a light novel: perhaps to this end the artist painted and in some degree he has succeeded, save only that it does not give one the rest of vacancy of mind, for like the puzzle "here is the tree and rat, but where is the cat?" It keeps continually annoying one with an interrogation. The color and drawing we accept as good, but as a whole we find this picture less interesting than the uncombined studies made for it by the artist.

In Mr. Emil Pissis we have an artist of yet another cult, one who cares not for the realities of life as we find them last, and so we find him seated beneath the vaulted ceiling of a Moorish palace or what-not watching the willowy motions of a slender dancer as she glides to and fro within a shaft of light that shines only that it may illumine one fair face. All around in semi-darkness and crouched upon the floor sit the spectators, thoroughly absorbed in the graceful movements of the dancer. Both in color and in drawing the picture is somewhat indefinite but gives promise that in future the artist may be able to add these without suggesting the suspicion of effort.

For every evil, beneficient nature provides a compensation, so let it be with us. The Art Association has made a sacrifice in exchanging the wholesome surroundings of their old quarters for these on Nob Hill. Let us hope that the mess of potage for which they surrender their birthright may be in some degree the measure of its value, and that what they may have lost in a sense of beauty may be offset in an accumulation of gold.

The magnificent vulgarity of the new quarters has aroused the curiosity of the populace, and now in place of the solitary one who saw something in a picture, one sees a score of eager gazers, willing to pay fifty cents for the privilege of entering this palace. Let us hope that in this manner sufficient funds may accumulate to enable the Association after a few years to throw off this incongruous thing that has grown around them, and acquire a more becoming habitation, one in which the jingle of gold and the ostentation of wealth will have no place, for, of a truth, these things belong only to those who robe themselves in purple and fine linen and dwell in the houses of kings, and have their dominion there; but this is not the kingdom in which art rules.

ARCHITECTURE IN APARTMENT-BUILDINGS.[1]

WE have been requested to give some information on the subject of apartment-building in France and especially in Paris; we respond with pleasure to this invitation by a brief *résumé* which we have the honor to present to you, as follows:

In the art of architecture, the house certainly is what best characterizes the taste, the habits and the morals of a people. From

[1] A paper read before the Congress of Architects of the World's Congress Auxiliary of the World's Columbian Exposition, Saturday, August 5, 1893, by F. Adolphe Bocage, member of the Société Centrale des Architectes Français, Paris, France.

the first centuries of the Middle Ages in France, the habitation in the country presents a character of defence while that in the city, occupying a narrower space from the necessity of surrounding these towns with walls as a protection against the enemy, was obliged to be raised, in order to find in height the space wanting in surface. The same conditions existed at Rome in ancient times where a great number of houses had several floors, while in the adjacent neighborhood this method does not seem to have been followed.

Other large cities in more modern times can be cited as examples of considerable increase in height, but happily, for very different reasons from those given above. I mention especially New York and Chicago. We believe that for these last, their geographical position and the tendency of commerce to concentrate itself in the centre of towns are the reasons for this agglomeration. If, in Paris, we have not attained these prodigious heights from love of the sun, the number of houses of six and seven stories above the ground-floor has increased considerably on account of the habit now generally adopted by Parisians of living in apartments in the city while keeping to the old custom for the country, that is to say, private houses.

It was under the reign of Louis XIV that the period of apartment-building began in Paris. The streets, laid out at a time when there was no thought of living at such an elevation, were sufficiently wide for small houses, but became too narrow after the change to higher buildings was made; and in a part of old Paris many streets are found in which air and light scarcely penetrate; it is well to say that all those streets and the houses which line them are condemned and will disappear sooner or later.

The regulations of buildings which apply to the reconstructions on enlarged streets are called: Rules for large and small thoroughfares.

These various regulations form, indeed, the basis upon which the plans of the ordinary apartment-buildings are established in Paris. Observing, now, the needs and tastes of the inhabitants, we will complete this short study by considering the comfort actually desired, according to the kind of apartments to be built.

For the most important we have in view the habits followed in private residences, the actual patrons for these being largely composed of wealthy men who have always lived in their own residences and now are gradually adopting more and more the idea of the apartment for several reasons.

The high price of ground in aristocratic quarters forced the owners first to suppress the garden, which was one very great advantage of the private residence, or to have one of restricted dimensions subject to the indiscreet curiosity of neighbors or surrounded by walls of adjoining buildings, sometimes sixty or seventy feet high. Moreover, for further reasons of economy, a small space of ground was found sufficient under the conditions of having three or four stories for the house. But this offered many inconveniences: the supervision of servants was difficult, and their numbers necessarily increased; and also, for large receptions, the reunion of several drawing-rooms on the same floor was impossible.

Finally, in spite of the advantages of individual liberty, the inconveniences indicated above have been found sufficiently important to induce many owners of private residences to give up their old habits, and adopt the better system of apartments.

We speak of this as a general rule, notable exceptions still existing, in which proprietors can afford expensive gardens and every luxurious surrounding.

The problem then, to be solved by the architect charged with the construction of luxurious apartment-buildings, is to suppress the disadvantage found in private residences, and to diminish as much as possible the inconveniences arising from the assembling of several families in the same house.

Generally these large apartments are divided into two parts: the one for family use and the other for occasions of ceremony, the former including a parlor, dining-room, several bedrooms and closets, bath-room, pantry and kitchen; the latter comprising ante-chambers, large dining-room, several drawing-rooms, billiard-room, smoking-room, boudoir, etc., with every convenience necessary for easy communication.

In these luxurious apartments there are usually two ante-chambers, the first for the servants, with simple decorations, the second more ornate and, sometimes a third, called waiting-rooms. It is to these different rooms that visitors according to their rank are admitted and obliged to wait. These different ante-chambers establish, with galleries, the communications between all the rooms of the apartment; a special passage for the servants is often placed parallel to the passage for the family that leads to the chambers.

In apartments of less importance, one or two ante-chambers with passages form the communication between the different rooms, which are all lighted and ventilated directly from the streets or large courts.

In these apartment-buildings, a passage-way for carriages is reserved, with an apartment for the concierge (or janitor) near the entrance; this passage gives access to the court of honor in which the carriages turn. The stables have their entrance on this court and front often on a court of service which is used for the washing of horses and carriages. Sometimes these stables are underground.

In the carriage-way is a vestibule entrance, reached by several steps which gives access to the apartment of the rez de chaussée or ground-floor, and to a second vestibule which forms the entrance to the principal stairway. This stairway, built of iron and marble or stone, or more simply in wood, is more or less monumental and richly decorated according to the importance of the apartments, but in all cases is considered a subject for decoration and the electric or hydraulic elevator for the use of all the apartments is enclosed in a special place apart from the stairway.

To avoid the meeting of servants in the principal passage-way, a passage for service is sometimes made with direct access to the street and leading to the servants' stairway placed at the back of the house and leading to the ante-chambers of the various kitchens and to the servants' rooms on the top floor. In connection with this stairway is an hydraulic freight-elevator going from the cellars to the highest floor, for the use of all the apartments.

An electric or hydraulic letter-carrier starting from the concierge's apartment leaves letters and papers in a box placed in each of the apartments. A telephone is often installed in the apartments, or more frequently in the concierge's apartment for the use of all.

A furnace, heating all the rooms of the different apartments except the bedrooms, is placed in the cellars under the care of the concierge.

We will say nothing about the materials of construction nor of interior decoration. We think that in finishing by some remarks on certain laws in regard to light and air in apartment-building in Paris we shall have attained the object proposed by the title of this paper.

This consideration is important from the standpoint of hygiene, and laws on this subject are rigorously applied to tenement-houses, as well as to larger apartments, though, as to the latter, the exactions of tenants exceed the requirements of law.

The city regulations strictly forbid the lighting of a habitable room (that is, one large enough to hold a bed) from a court measuring less than two hundred square feet in a house sixty feet high. In general, custom as well as the law requires that not only the rooms of the upper stories, but all those of the lower stories, even to the ground-floor, shall have sunlight. In this connection, I will refer to another regulation relative to the height of the houses.

The highest house which can be built in Paris, and this only allowed on streets not less than sixty-five feet wide, must not be higher than sixty-five feet, including the attic. The mansard roof above must be within an arc, the radius of which cannot exceed thirty feet, this by way of increasing the space for the passage of light and air. Nothing, not even a moulding or a gutter, can be allowed beyond this line. After the building is finished, a special supervisor of the city examines the work, and can order its demolition if it has not been executed in conformity with the regulations of the city.

These laws, necessary for public hygiene and for the cheerfulness of the streets, have their inconvenience from a purely artistic standpoint, as they are the cause of the monotony of façades of apartment-buildings in Paris. Their *silhouettes* being uniform, the talent of the architect has to struggle against this drawback in order to produce an original effect in this kind of construction. His compensation lies in the fact of his entire liberty in matters of detail and interior decoration.

The regret I have just expressed in thinking of the severe regulations of Paris must be followed by my congratulations to my American *confrères*, whose unfettered imagination has produced such remarkable works in so short a time.

My duty calls me to make a report to the Ministry of Fine Arts of France and to the Société Centrale; it will be inspired by my admiration for the beautiful results obtained from this liberty in art, which is the privilege of America, and also by the cordiality with which my *confrères* have received my efforts.

THE HYDRAULIC WORKS AND SYSTEM OF HYDRAULIC POWER-SUPPLY AT GENEVA.[1]

THERE is now in operation at Geneva one of the most remarkable hydraulic power-stations in the world. The water of the River Rhone, near the point where it flows out of Lake Leman, is employed to drive a number of large low-pressure turbines, giving a total of 4,500 effective horse-power. These turbines pump pure water obtained from the lake into two systems of mains. The older of these, termed the low-pressure system, the pressure at the pumps being 160 to 200 feet, is an extension of a previously existing system of mains used for supplying potable water to the town of Geneva. Although some of the water pumped into this system is used for power purposes, it is chiefly intended to supply water for domestic and municipal purposes. The second system of mains, termed the high-pressure system, the pressure at the pumps being 460 feet, supplies potable water to some districts not reached by the low-pressure system, but it is specially intended to afford a supply of water for motive-power purposes to the entire area of the town. The demand for water, both on the low and high pressure systems is a fluctuating demand, large during the day, and very small during the night. Hence, if the turbines in the Rhone were employed solely in pumping into the mains, they would not be continuously working, and a large part of the water-power of the Rhone would be wasted. To meet this difficulty, an important storage-reservoir has been constructed at Bessinges, about four kilometres from Geneva. The turbines pump water up to this reservoir at night, and at times when the demand for power for other purposes is insufficient to keep them fully employed. The energy derived from water flowing back

[1] Extracts from a lecture delivered before the Society of Arts by Prof. W. Cawthorne Unwin, and published in the *Journal* of the Society.

from the Bessinges reservoir through the high-pressure system, represents parts of the water-power of the Rhone which would necessarily have been wasted if this means of storage had not been provided.

The works at Geneva have been gradually developed under special local conditions. In spite of natural and political isolation, manufacturing industries have for centuries flourished at Geneva. That they did so is partly owing to the fact that cheap water-power could be obtained by simple forms of water-wheel placed in the ample and rapid Rhone, flowing past the town. An industrial quarter gathered along the banks of the river, and factories were built even in the stream itself. As the population increased, a water-supply was required. The small aqueducts of spring water became insufficient, and further recourse was had to the motive-power of the Rhone. From the beginning of the eighteenth century, water-wheels placed in the Rhone pumped a water-supply into the town.

Then arose an antagonism to the utilization of the motive-power of the Rhone, which, for two centuries, hindered the progress of industrial enterprise at Geneva, and threatened at times to destroy the existing industries. The properties of riparian owners on the shores of Lake Leman were from time to time injured by the rising of the lake-level. It was not unnatural that the landowners should attribute the disastrous inundations from which they suffered to the obstacles created at the outlet of the lake, that is to the bridges and buildings, and especially to the factories and water-wheels in Geneva. Complaints were addressed by the Canton Vaud to the Federal Government at Berne of damage caused by the works at Geneva. Then arose a question of arrangements necessary to regulate the lake-level, and to facilitate in time of flood the discharge of the water. From 1875 the project of utilizing the motive-power of the Rhone took a new magnitude and importance from the combination with it of plans for regulating the level of Lake Leman, and so ending a long and bitter controversy.

Another local circumstance had great influence in determining the ultimate form of the project for the utilization of the motive-power of the Rhone. In 1871, Col. Turrettini,[1] the engineer under whose direction the present works have been constructed, had applied to the Town Council at Geneva to place small pressure-engines on the mains of the then existing low-pressure water-supply. The plan of obtaining motive-power in this way proved so successful and convenient that, in 1880, there were 111 motors at work, using 34,000,000 cubic feet of water annually, and paying a yearly rental for power-water of £2,000. The cost of the power at that time to consumers was at the rate of £36 to £48 per horse-power per year of 3,000 working hours.

In 1878, a private firm asked the concession of a monopoly of the motive-power of the Rhone, at Geneva, on condition of carrying out works necessary for facilitating the discharge from the lake, and regulating the lake-level. A similar offer was made in 1881. But there grew up a feeling that such works should be carried out by and for the profit of the town itself. Finally, after many studies the contract was given by the Municipality in 1883 to M. Chappuis to construct under their direction the present works.

These works have cost, altogether £283,000. Of this sum, a fraction has been paid to owners of land on the shores of the lake and part has been expended in constructing new sewers required in consequence of the alterations of river-level. Deducting these items, the cost of utilizing the motive-power of the Rhone has already amounted to nearly £200,000.

The scheme included the clearing away of all obstacles to the free flow of the river, and the division of the river, by a longitudinal embankment, into two portions, one forming a head-race to the turbines, the other — which was straightened and deepened — forming an outlet for the surplus water from the lake. Between the two divisions of the river-bed are movable sluices, which keep up the water in the head-race channel, or discharge surplus water into the tail-race channel, according to the condition of the lake. The scheme also included a complete re-construction of the old pumping-system for the low-pressure water-supply, the creation of the new system of high-pressure water-supply and the provision of motive-power also by hydraulic transmission to the industries of the town.

The Low-pressure River Turbines. — The turbine and pump house is placed at the end of the left-hand channel or head-race. The turbines are of 210 horse-power each, and fourteen groups of turbines and pumps have been erected. Four more groups, of somewhat greater power, are expected to be erected within the next five years. The turbines are Jonval pressure turbines, constructed by Messrs. Escher, Wyss & Co., of Zurich. They have vertical shafts, and each turbine drives from a crank two horizontal double-acting Girard pumps, placed at right angles.

The head at the turbines varies from 5.5 feet, when the river is in flood, to 12.14 feet when the volume of flow is smallest. With most forms of turbine this would involve a considerable variation of the normal speed, or speed of greatest efficiency. The turbines are skilfully arranged to meet this variation of head. The turbine wheel and its corresponding system of guide passages is arranged in three concentric rings. When the fall is great, and the quantity of water used is smallest, the outer ring only is open, and the water acts at a large radius. As the fall diminishes, the second ring is opened, and the mean radius, at which the water acts, is smaller. In the lowest condition of the fall, when most water must be used, all three rings are open, and the mean radius at which the water acts is smaller still. The number of rotations of the turbine depends entirely on the velocity due to the head and inversely on the radius at which the water enters. Hence, as the radius diminishes as the head diminishes, a fairly constant speed of rotation is obtained. The adjustment is such that, with the highest fall, the normal speed is 27 revolutions per minute, and with the lowest fall, 24 revolutions per minute, a variation not practically serious in working pumps.

The fixed distributor over the turbine-wheel is 13.78 feet in external diameter and 5.74 feet in internal diameter. It is divided into three rings, having 52 guide passages in the outer ring, 48 in the middle ring and 40 in the inner ring. The external ring has no regulating sluices, regulation being affected, when that ring only is open, by the sluices in the head race. The other rings are arranged so that over one semicircle the orifices open vertically on an annular plane surface, and over the other semicircle they open horizontally on a cylindrical surface. Each ring of passages has two regulating sluices, one a semicircular annular plate for the orifices opening vertically; one a semi-cylinder for the openings which are horizontal. Each sluice can be fully opened without interfering with the openings corresponding with the other. The sluices are worked by gearing. The turbine-wheel is of cast-iron, in two halves. It has wheel-passages corresponding to those in the distributor.

The vertical support of each turbine consists of a fixed wrought-iron pillar, carrying at its top a steel step for the pivot, and a steel revolving hollow shaft hanging from the pivot at the top. The pivot is 6 inches diameter. A crank at the top of the shaft drives two Girard double-acting pumps placed at right angles from a single crank-pin. The Girard pump consists virtually of two plunger-pumps placed end to end, the advantage being that the stuffing-boxes for the plungers are accessible and there is no internal packing. The two pumps discharge into a single air-vessel placed between them. The diameter of the plungers of the low-pressure pumps is 1.41 feet, that of the high-pressure pumps 1.08 and 0.85 feet. The stroke is 3.61 feet and the mean velocity 188 feet per minute. The valves are ring-valves with leather faces. The high-pressure pumps supply mains of 20-inch diameter, and of 24-inch and 16-inch in the other. The low-pressure pumps supply two mains of 20-inch diameter.

The High-pressure Reservoir at Bessinges. — When the high-pressure system was first put in operation, a constant pressure was maintained in the mains, by constantly pumping in excess of the demand, and allowing the surplus to flow away through a relief-valve. This involves a constant waste. To further moderate fluctuations of pressure, four large air-vessels (additional to those at the pumps) were erected. These were 5 feet in diameter, and 39 feet high, and were kept charged with air by a Colladon compressor. When it became a question of driving the electric station by turbines driven by water from the high-pressure system, the need of a storage-reservoir became pressing. At four kilometres from Geneva a site was found, at an elevation of 390 feet above the lake, and it was decided to construct a reservoir capable of storing the discharge of three groups of pumps working through the night. The discharge of the pumps is 34,000 cubic feet per hour, of 442,000 cubic feet per 13 hours, during which, if there were no means of storage, they would be put out of action.

The reservoir is a covered reservoir, capable of containing 453,000 cubic feet. It stores, therefore, 5,573 gross horse-power hours of energy. Allowing for the loss at the motors driven by the pressure-water, the reservoir will furnish about 800 effective horse-power for five hours. It serves as a perfect regulator of pressure. A float with electric signal and recording apparatus shows constantly in the pump-house the condition of the reservoir.

Hydraulic Pressure Relay or Compensating Pressure Regulator. — The 16-inch pipe main from the pumping-station to the reservoir at Bessinges being four kilometres in length, there would be a difference of pressure in the mains in Geneva equivalent to the friction of eight kilometres of main, according as water was being pumped up to or flowing back from the reservoir. This would not have been very serious if all the motors driven by the water had been supplied by meter. But the larger motors are supplied by gauging, the quantity of water used being computed from the area of the orifices of discharge. Variations of head would have involved a variation of the quantity of power developed at the motors amounting to 20 per cent. This would have hindered the development of that method of estimating the charge for water.

To prevent this variation of head, Col. Turrettini devised a centrifugal pump relay, which comes into action automatically and increases the pressure whenever the water is returning from the reservoir to the town. The centrifugal pump, which forms part of the main, is driven by a turbine so regulated for speed that a constant pressure is obtained on the town side of the pump. The pump receives, at the maximum, 635 cubic feet of water per minute and can give to the stream passing through it an increase of pressure of 30 feet. The turbine works with 380 feet of head and can exert 120 horse-power.

The sluices of the turbine are governed by an automatic pressure-regulator. The pressure in the main acts on a piston controlled by a spring. According to the position of the piston, the turbine sluices are open more or less. The movement of the piston actuates the valve of an hydraulic relay which operates the turbine sluices. During

[1] "Utilisation des forces motrices du Rhone et régularisation du lac Leman.' Th. Turrenttini, Ingenieur Conseiller Administratif délégué aux travaux. Geneva, 1890. This admirably illustrated memoir fully describes the origin rogress and details of all the works at Geneva.

the filling of the reservoir the centrifugal pump is at rest, the water merely flowing through it. When water flows back from the reservoir the turbine begins to drive the pump so as to increase the pressure in the main. The arrangement has worked with perfect success.

The Motors used in Geneva. — The original motors used in Geneva were Schmid pressure-engines and these are still used for small powers. They use a quantity of water which depends on the speed only and not on the work done. Hence they are uneconomical with light loads. They are convenient and cheap, they can be run at any speed and they act as meters of the quantity of water used. A counter on the pressure-engine recording the number of revolutions gives the means of ascertaining accurately the quantity of water used. At full load their efficiency is 80 per cent.

For all larger motors impulse-turbines are used. The maximum efficiency of these is 75 per cent and it is not much less with light loads. They occupy little space and can be perfectly governed to constant speed by the ingenious relay governors of Messrs. Faesch and Piccard. In Geneva the question of speed regulation was found to be an important one. The industries connected with watch-making required motors running at constant speed.

The Electric-lighting Station. — In 1887, the City Council came to an arrangement with a company for supplying electricity. It was part of the arrangement that the company should use pressure-water, supplied by the town, as motive-power in all its installations. The pressure-water is supplied to the company by meter, at a price of two centimes per metre cube, with a minimum of 400,000 cubic metres annually. This is equivalent to a little more than £3 per effective horse-power per annum. The advantage to the town is that their pumping machinery can be run constantly, night and day, the energy, which would otherwise be wasted, being stored. The electric company, on the other hand, get power at a cheap rate, and their turbines being driven by high pressure are convenient and cheap and run at an extremely constant speed.

Under the arrangement an electric station has been installed in the old pumping-station, no longer required for its original purpose. There are three impulse turbines of 200 horse-power each, and each turbine drives two dynamos directly coupled to it by Raffard couplings. There is also a 25 horse-power turbine and dynamo for day work. It is the system of reservoir storage which makes this hydraulic driving of the dynamos possible and economical. They could not be driven so conveniently by the large low-pressure turbines in the river, with the very varying head which they have to utilize, nor could power be spared to drive them, except by utilizing the motive-power of the flow of the river through the night.

ILLUSTRATIONS

[*Contributors of drawings are requested to send also plans and a full and adequate description of the buildings, including a statement of cost.*]

THE UNION TRUST COMPANY'S BUILDING, BROADWAY, NEW YORK, N. Y. MR. GEORGE B. POST, ARCHITECT, NEW YORK, N. Y.

[Gelatine Print issued with the International and Imperial Editions only.]

SKETCHES BY THE *American Architect* TRAVELLING-SCHOLAR FOR 1892. MR. W. M. MACCAFFERTY, BROOKLYN, N. Y.

[Issued with the International and Imperial Editions only.]

TWO DESIGNS FOR A SUBURBAN HOUSE SUBMITTED IN A COMPETITION OF THE CINCINNATI SKETCH-CLUB, BY MR. HARRY HAKE AND MR. M. HEISTER.

[Issued with the International and Imperial Editions only.]

COMPETITIVE PLANS FOR THE HÔPITAL BOUCICAUT, PARIS, FRANCE.

FOR description, see letter from Paris elsewhere in this issue.

STORE FOR LEVY BROS., LOUISVILLE, KY. MESSRS. CLARKE & LOOMIS, ARCHITECTS, LOUISVILLE, KY.

A COURT-WAY AT GIEN, FRANCE.

COTTAGE FOR BALLARD SMITH, ESQ., TUXEDO, N. Y. MR. JAMES BROWN LORD, ARCHITECT, NEW YORK, N. Y.

HOUSE AT NORFOLK, CONN. MESSRS. STEVENSON & GREENE, ARCHITECTS, NEW YORK, N. Y.

DESIGN FOR ENTRANCE TO MCPHERSON BARRACKS SUBMITTED IN A COMPETITION OF THE ATLANTA ARCHITECTURAL SKETCH-CLUB, BY MR. W. L. STODDART.

[Additional Illustrations in the International Edition.]

THE HEROIC SILVER STATUE OF COLUMBUS AT THE WORLD'S FAIR, CHICAGO, ILL. M. F. A. BARTHOLDI, SCULPTOR.

[Gelatine Print.]

AMONGST the countless exhibits of the World's Fair there are two of very unusual and, it must be admitted, very unequal value when considered as works of art, and it must be further admitted that a great part of the interest felt by spectators in either case is excited by the rather vulgar fact that these exhibits have been executed in a precious metal at a scale not often used when such costly material is employed. These two exhibits are the silver statues of "Justice," by the sculptor R. H. Park, and the even larger figure of "Columbus" by the sculptor F. A. Bartholdi. The first of these statues forms part of the Montana State exhibit in the Mines Building and has achieved notoriety less because of its merits as a work of art or because of its being cast in silver than because it was asserted that a well-known actress, Miss Ada Rehan, had posed to the sculptor for the model. The newspaper discussion that arose out of this seemingly unimportant fact was both voluminous and tedious to a degree, and the fact that we have not seen any mention of the statue since the day when it was unveiled almost justifies the belief that the newspaper excitement was worked up by a clever advertising manager, working in the interests of — whomsoever it concerned.

The other statue, the "Columbus," is sufficiently a work of art to command attention no matter what might be the material composing it, and we are free to say that on first seeing the photograph of the model and later the model itself our first feeling was surprise that a sculptor of Mr. Bartholdi's real rank should have succeeded in modelling a figure which had so many really good points about it. This statue forms part of the exhibit in the Liberal Arts Building made by the Gorham Manufacturing Company, to whose courtesy we owe the pleasure of witnessing the very unusual operation of casting in silver a figure of such size and requiring the melting of so great a weight of a metal which, in spite of the efforts of our Colorado friends, still is held by the world to be precious.

The process of casting in silver is the same as that used where the material is the more common bronze alloy, and a stream of melted silver looks not different from a similar stream of any of the higher metals when heated to a point of white liquefaction. The details of the process of founding are always interesting, but we will not now stop to describe the methods and the more than ordinary care required where a precious metal is used. It is enough to say that the casting was in every particular successful and that the unusual undertaking was accomplished without serious delay or mishap having been encountered at any stage of the proceedings.

The figure of "Justice" (Miss Rehan's), is 5′ 10″ high and stands on a globe borne by an eagle, and the silver used, weighing about 1,631 pounds Troy, cost, it is said, $61,800. The cost of the statue as exhibited, including the cost of the gold plinth, the model, etc., is said to have been $307,675. As this statue is to be exhibited in various parts of the country after the closing of the Fair, those who have not visited Chicago this summer may be able to inspect one of the curiosities which have been there exhibited.

Such a fate, we fancy, will hardly befall the "Columbus," as the Gorham Company is not in the "show" business, but those who are interested in such matters will probably for some years to come have a chance to see the figure either at the warerooms of the concern in New York or at its great factory in Providence. Even if this should not be the case, because of the passage of the metal once more through the melting-pot and its representation to the world in the guise of "souvenir spoons," people are to be enabled to see Bartholdi's work perpetuated, since Mr. Henry C. Clarke has presented a replica of the statue in bronze to the city of Providence, this second cast being also the work of the Gorham Manufacturing Company, and it is likely to be set up at the junction of Reservoir and Elmwood Avenues next month.

As for the silver original — which is supposed to be solid by those who do not know how thin is the shell of which metal statues are composed — it cost, even at the rates which this great silver-working company can command, some $25,000 exclusive of the sculptor's fee and incidentals. For the casting 30,000 ounces Troy, .925 per cent fine, were melted and nearly all had to be run into the mould. Of course, a certain part of this was taken up in the form of "gates," which had to be trimmed off in the process of finishing, so that we cannot state even the approximate manufacturing cost of this statue which is rather larger than life-size. As for its value as a work of art, the illustration will enable the reader to form his own opinion.

CORRIDOR OF THE EQUITABLE INSURANCE BUILDING, DENVER, COL. MESSRS. ANDREWS, JAQUES & RANTOUL, ARCHITECTS, BOSTON, MASS.

[Gelatine Print.]

NORTHWEST PAVILION OF THE LIBERAL ARTS BUILDING, JACKSON PARK, CHICAGO, ILL., SHOWING LUNETTE DECORATION, BY MR. FRANK D. MILLET.

[Heliochrome.]

COUNCIL CHAMBER AND LIBRARY, INSTITUTE OF CHARTERED ACCOUNTANTS. MR. JOHN BELCHER, ARCHITECT.

THE drawing now reproduced was exhibited in the last Academy Exhibition.

CHURCH OF ST. THOMAS OF CANTERBURY, WEST HILL, WANDSWORTH, ENG. MR. EDWARD GOLDIE, ARCHITECT, KENSINGTON, LONDON, ENG.

THIS church, which is now in course of erection, will stand on a commanding site at the northwest corner of the Richmond Road and of Santos Road. It will consist of a nave 92 feet by 30 feet, an

arcade of four bays on the north side opening into the double transept and aisle, and on the south side an arcade of five bays. The aisles are 15 feet wide. At the west end of the north aisle will be the tower, 25 feet square exclusive of buttresses, the lower portion of which is destined to be the baptistery. In the angle formed by the west end of the nave and the south aisle will be the south porch. There are two arches between each of the double transepts. The north transepts are each 15 feet by 25 feet, and those to the south 15 feet by 23 feet. The chancel is 28 feet by 30 feet. It is separated from the nave by a chancel arch, and divided on either side into three bays, the lower portion of two of which open on either side into side chapels. The lady chapel to the south is 27 feet long by 15 feet. The chapel to the north is 20 feet by 11 feet 3 inches. Over the latter is the organ-chamber, approached from the sacristy, and having openings into the chancel and the northeast transept. The two sacristies, opening one into the other, are in the northeast angle. The boys' sacristy, 17 feet 6 inches by 13 feet 3 inches, communicating with the transept, and the priest's sacristy, 26 feet 3 inches by 16 feet, having a door giving direct access to the sanctuary. The latter will be connected by a lobby with the future presbytery, and under it will be the heating-chamber. There is no clerestory. The nave will be lit by a large seven-light west window. This and the rest of the building will be abundantly lighted by the large three-light windows of the aisles and transepts. The chancel is lit by three two-light windows on either side, and the lady chapel by three small two-light windows. The nave roof is a barrel, with ribs, tie-beams and king-posts. The aisle roofs are flat, richly panelled, and rising to within a short distance of the nave eaves. The transept roofs are plain barrel. The chancel roof will be groined in wood, and those of the side chapels will be flat and richly panelled. The baptistery will be vaulted in stone. The main entrance at the west end will be under a deeply-recessed and richly-moulded arch, and will consist of two doorways, with a statue of the patron saint in a canopied niche standing between them. The body of the church will be floored with wood-block flooring throughout, deal under the seating and oak being used in the alleys. It is proposed to have marble floors in the chancel and side chapels and tiles in the baptistery. It is unnecessary to describe the exterior; our illustration speaks for itself. Suffice it to say that in design the church is a free treatment of Flowing Decorated, the detail being rich and very delicate, and that the materials used are red bricks of a bright color and light pointing, and that the stone used is to be Bath, with a few exceptions. The building is to be covered with Westmoreland slates. In conclusion we may mention that the average height of the nave to the ridge is 56 feet; the tower is 63 feet to the top of the parapet, and 114 feet from the ground to the apex of the octagon above. The nave only is being built at present, but it is anticipated that before long the aisles, transepts and lower portion of the tower will be put in hand.

BIRMINGHAM MUNICIPAL TECHNICAL SCHOOL. MESSRS. ESSEX, NICOL & GOODMAN, ARCHITECTS.

COMMUNICATIONS

[*The editors cannot pay attention to demands of correspondents who forget to give their names and addresses as guaranty of good faith; nor do they hold themselves responsible for opinions expressed by their correspondents.*]

ENGLISH PORTLAND CEMENT.

NEW YORK, N. Y., October 17, 1893.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—Your editorial comment in issue of last week on the review by the *Builder* of Mr. W. M. Patton's book on Foundations, does an injustice to English Portland cement that we believe you will not willingly pass without correction in as prominent a manner, especially as strong terms are used when it is said that architects within the last ten years have endeavored to find a brand of English Portland cement any two barrels of which would have the same properties—that it was spoiled by dampness—which would set in something like a definite time if at all—which is thoroughly and evenly ground—and which could be depended upon not to swell after setting and burst the masonry laid with it.

We regret that *The American Architect and Building News* which we have considered an authority, should through prejudice or other causes have erred on the wrong side, for not to know that there are several brands of English Portland cement, conceded by architects, engineers and contractors to be the finest and most uniform quality, is to argue deficiency of knowledge.

For instance, Black Cross English Portland cement was used for the foundations of Congressional Library Building, Washington, and General Meigs, after stating average tensile strength, evenness and setting quality, concluded by giving his judgment that "*it was excellent cement and much stronger than any cement known to him.*"

The foundations of some of the largest buildings in the United States stand on concrete made with Black Cross English Portland cement, whilst for artificial stone and pavements it is equally appreciated with German cement, and here it is appropriate to state that since some require German cement without specification as to quality, a great deal of inferior stuff to which your condemnation would apply, is imported and sold at low figures simply because architects and engineers may specify "German Cement."

There are inferior and adulterated cements sent from England as well as from Germany and Belgium to the United States, and to exclude their employment specifications should name such brands of Portland cements that by continual testing are known to be uniform and imported by reputable firms.

Your strictures should not apply to all Portland cement from Great Britain simply because it is "English, you know."

Yours truly, FLEMING CEMENT & BRICK COMPANY,
HOWARD FLEMING, *President.*

[WE are pleased to publish this statement as we are anxious only to place facts and truths before our readers. Our comments, based partly on personal experience as well as on that of other architects, were called out solely by the absurd assumption of the *Builder* that Americans were willing to use only such materials as could be had cheap.—EDS. AMERICAN ARCHITECT.]

THE ARCHITECT AS THE OWNER'S AGENT.

PROVIDENCE, R. I., October 11, 1893.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—In view of the decision of the Court of Appeal of Great Britain, in the case of Lelièvre *versus* Gould, is it not settled, as far as the English courts can settle it, that the architect is the agent of the owner, and if, as I infer, this is the proper interpretation to be put upon the decision, does it not show that the Uniform Contract, as framed by a committee of the American Institute of Architects and the National Association of Builders, is correctly worded in so designating the architect?

In the case referred to, an action was brought by the plaintiffs "against the defendant Gould to obtain a declaration that the defendant, a surveyor, was liable to make compensation to them for the loss that they had sustained by reason of untrue certificates which he had given as to the progress made in the building of certain houses."

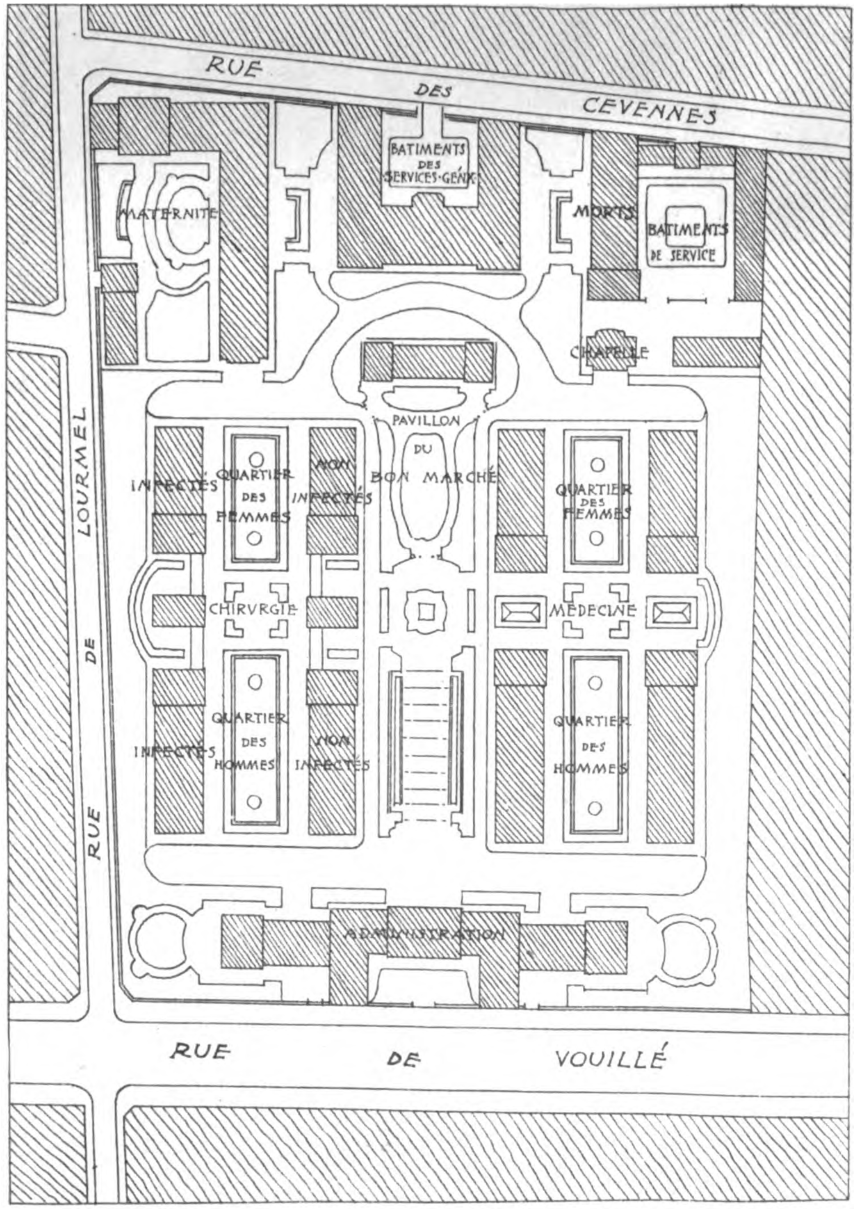
The defendant alleged that in giving the certificates he had acted *bona fide* and in the belief that the statements contained in the certificates were true. The *Law Journal* in a brief summary of the case says: "The decision has now finally settled the much-debated question whether the architect or the surveyor employed under the building contract is under any liability to the builder for any inaccuracies or for any act of omission in the discharge of the duties imposed on him by the contract. In such cases there is no privity of contract between architect and builder. The architect's contractual duties are toward the employer only. For any neglect of them causing damage to the employer he is responsible in damages, and *is not, as was currently supposed by the profession, entitled to the immunities of an arbitrator to protect himself by his certificate from his own negligence.* In Cann *v.* Wilson, a valuer employed by a mortgagor was held by the Court to be liable to the mortgagee for damages arising from adopting the valuation, and in the case now under review it was attempted to render the building-owner's surveyor liable to the builder's mortgagees for losses alleged to have been sustained by them by reason of his certificate. But this decision was rejected by the Court of Appeal which decided that, in the absence of fraud, the surveyor owed no duty to the mortgagees, and held that Cann *v.* Wilson must be treated as over-ruled by the decision of Derry *v.* Peak in the House of Lords. There is no distinction between the position of the builder and of his mortgagee, and the result of the decisions stated is that while the building-owner has a remedy against his architect for failure to do his duties under the contract, the builder has no such remedy, unless he can show fraud or collusion; and can neither recover without a certificate, nor sue the architect for errors in it, nor appeal to the Court to rectify the errors."

In the same number of the *Journal of Proceedings* of the Royal Institute of British Architects, which contains the above cited decision, we find the following statement copied from a review by William H. White of "*L'Architecte moderne devant le Code Civil.*" Par Achille Hermant, Architecte Honoraire du Department de la Seine. 8° Paris, 1893. (M. G. Delarue, Libraire-Éditeur, 5 Rue des Grands Augustins, Paris.)

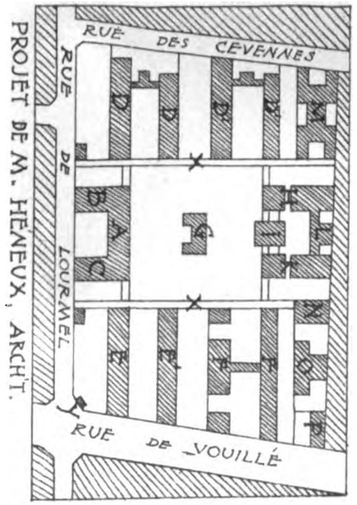
"At the present moment the architect makes the design, determines the conditions of execution, and estimates the approximate cost; he then confides the work to a general contractor, or to several contractors, who may be chosen by the employer or selected by other means, and on this point the modern architect acts simply as an adviser. The contract is made between the employer and the contractor; the architect is no party to it. During the progress of the works the architect's mission is to direct, to watch over (*surveiller*) them and those engaged upon them, and to see that the buildings are carried out in accordance with the drawings, the specification, and the terms of the contract. He, an expert in the art of building, receives a mandate to act as *the agent of the employer supposed to be ignorant of that art.* He does not construct, properly speaking, for the employer; he controls those who do. Instead of being the antagonist of his employer, as was the case when the architect was also a contractor, he is his employer's supporter or defender, the guardian of his employer's interests. At the same time, by upholding the terms of the contract he is the protector of the contractor."

A. S.

S. J. PARKHILL & Co., Printers, Boston, U. S. A.



PROJET DE MM. LE GROS.



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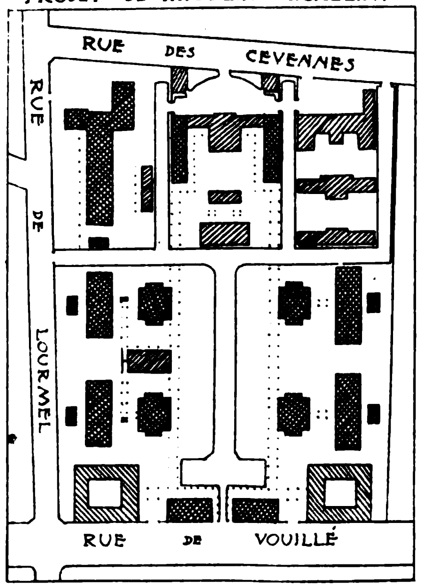

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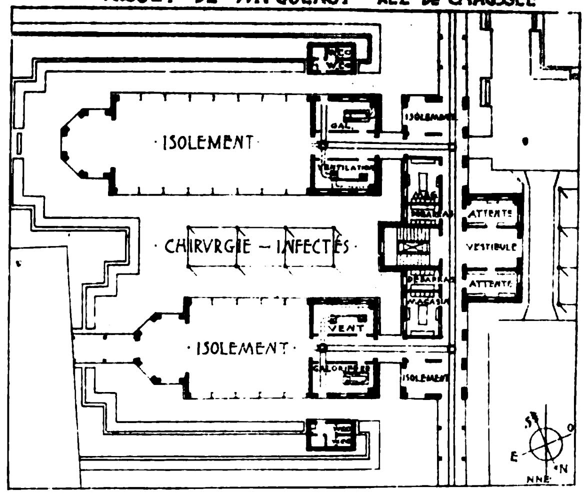
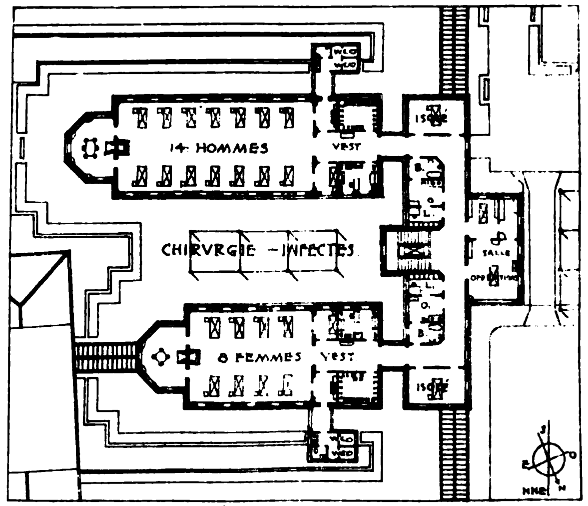
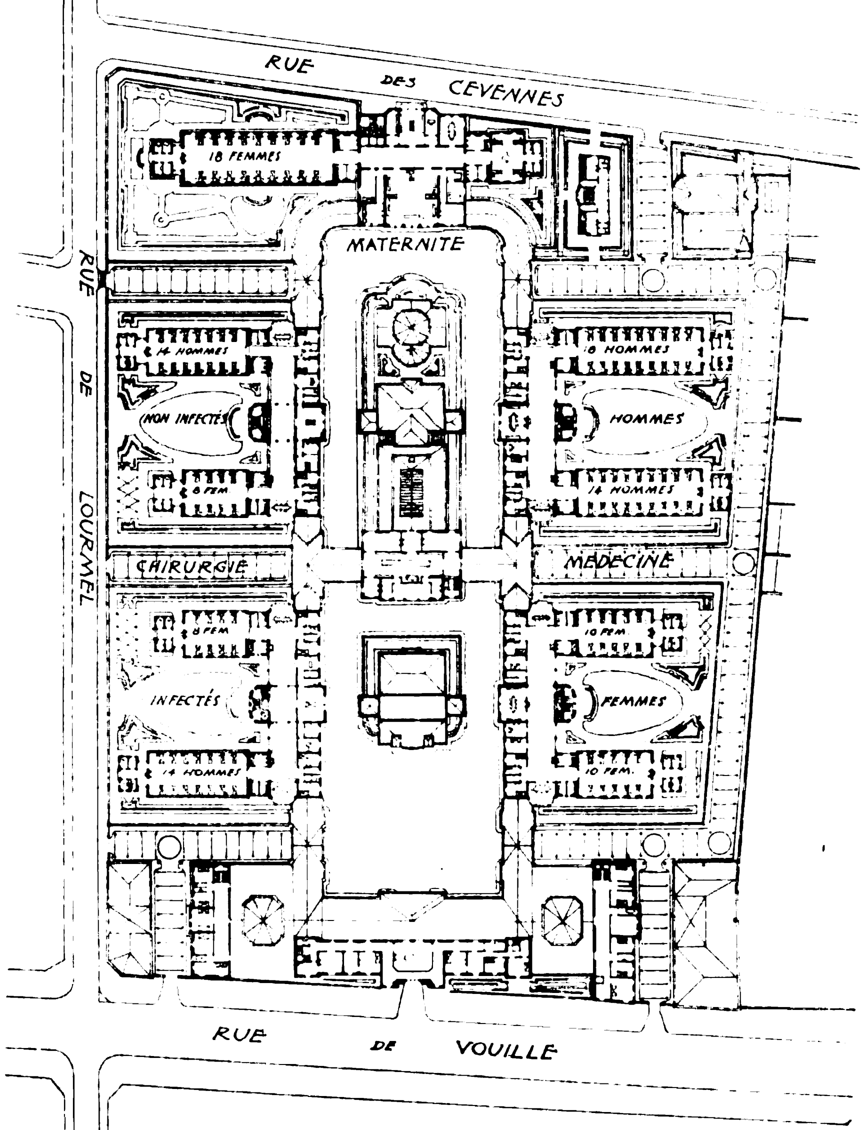




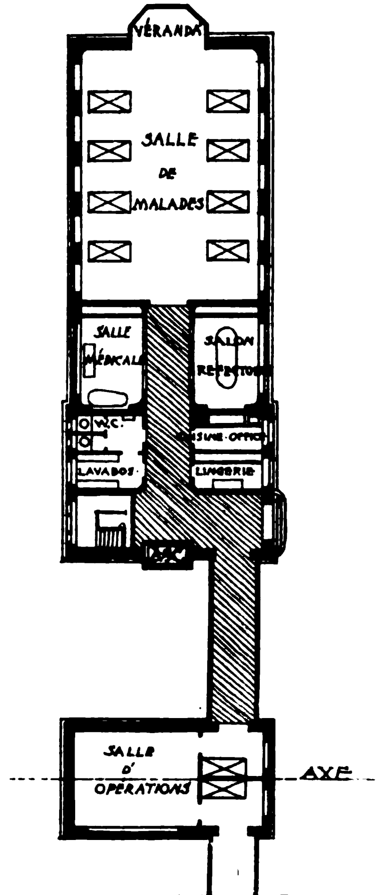
PROJET DE M. GUÉNOT. 1ER ETAGE.

COMPETITIVE PLANS FOR THE HÔPITAL BOUCICAUT, PARIS, FRANCE.

PLAN DU 1ER ETAGE

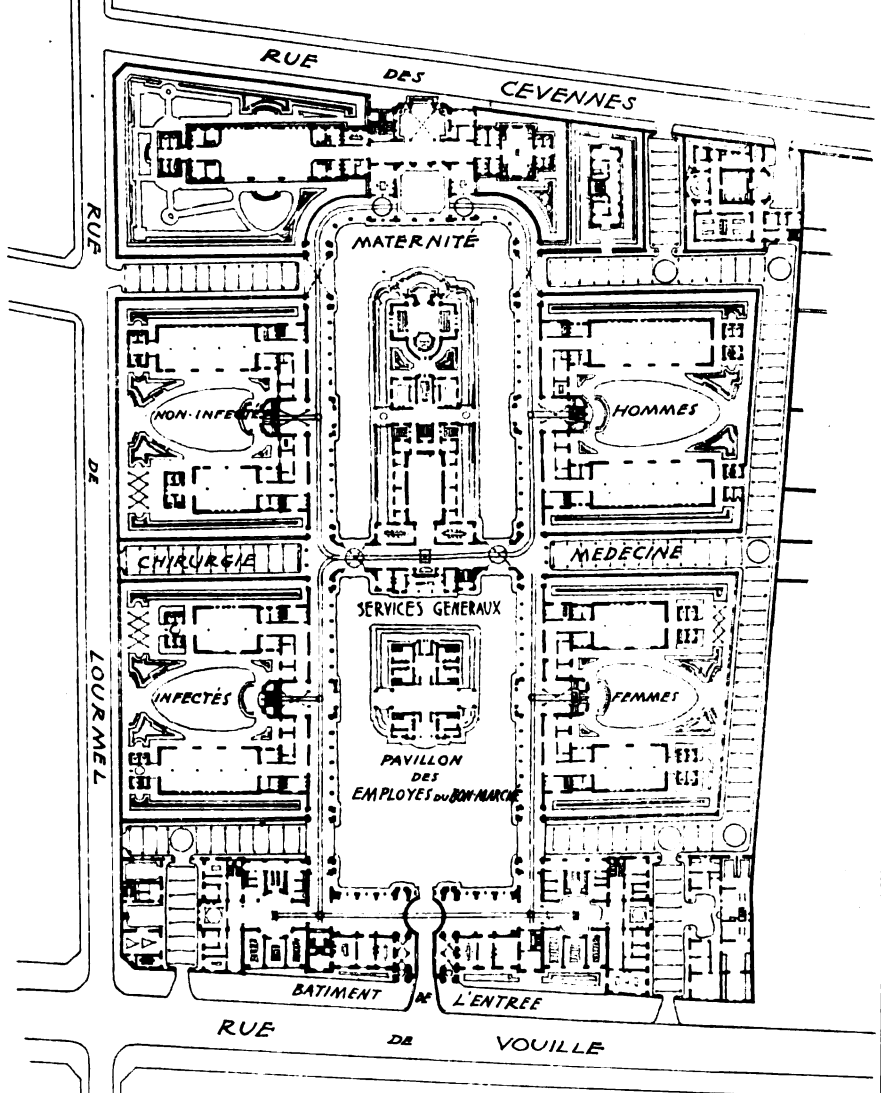


PROJET DE M. COURTOIS-SUFFIT



DÉTAIL D'UN PAVILLION DE CHIRURGIE · PROJET DE MM. LE GROS

PLAN DU REZ DE CHAUSSEE.



PROJET DE M. COURTOIS-SUFFIT

HELIOTYPE PRINTING Co BOSTON

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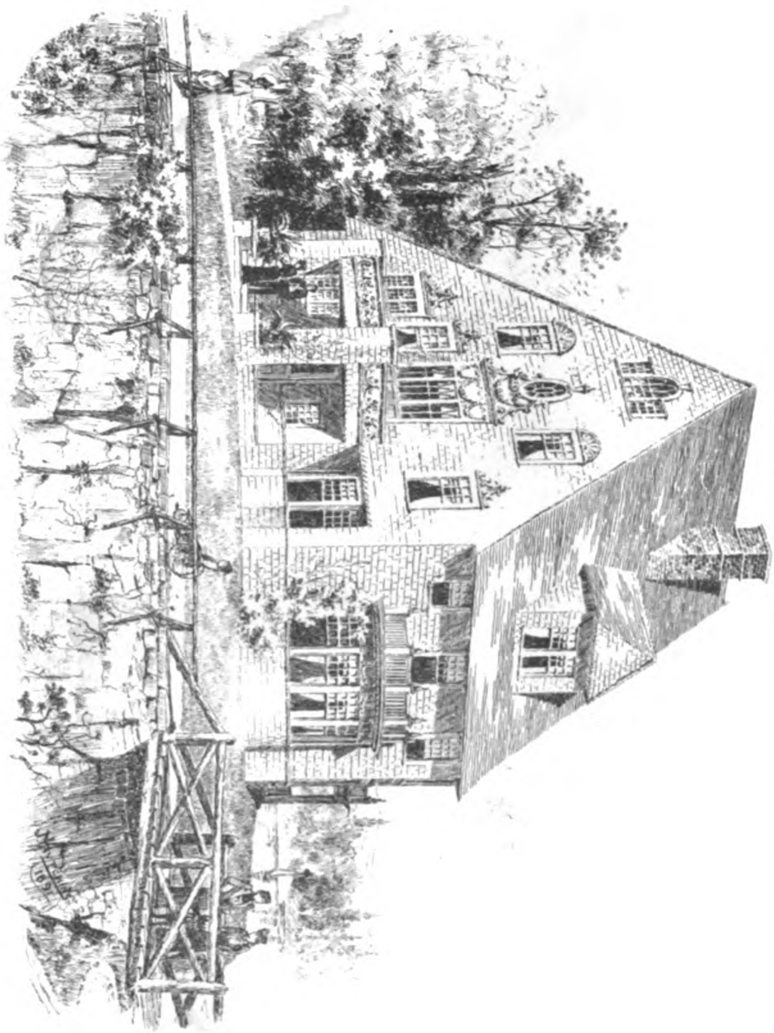
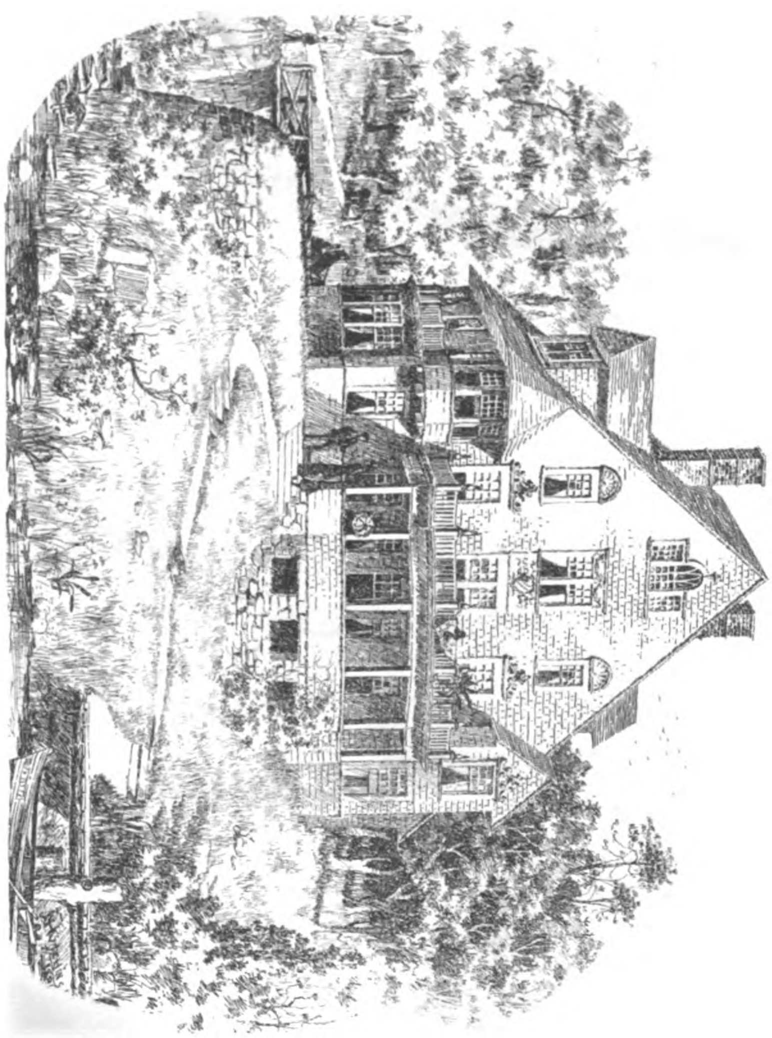
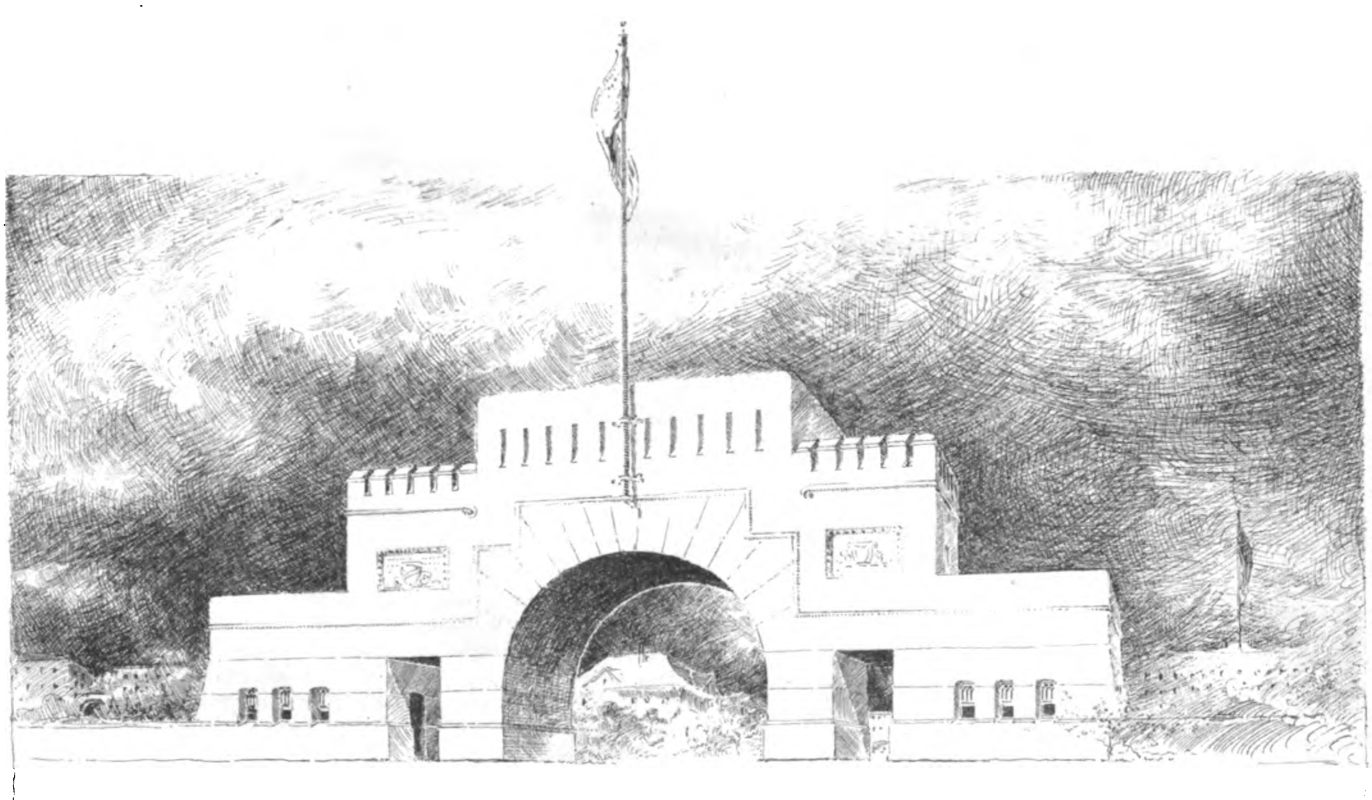




Cottage at Leeds -
for Ballard Smith Esq.

Jas Brown Lord -
Archt.



Submitted by "Georgia Granite".

Atlanta Architectural Sketch Club Competition. Entrance to McPherson Barracks, Atlanta, Ga. W. L. Stoddart Del.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

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OCTOBER 28, 1893.

CONTENTS

WE have received other intimations, besides the letter from Mr. Howard Fleming, published last Saturday, that the comparison which we made between English and German Portland cements, in our comments on a certain article in the *Builder*, was unfair toward the English cements. We should be very sorry to disparage the good English Portland cements, which we know to be very good, and perhaps our haste to correct the assertion of the *Builder*, that German cements were preferred here because they were cheaper, led us to overlook the sterling qualities of the best English brands. This is, however, just what most architects do, so that we were, perhaps, not far wrong in our description of the attitude of American architects and engineers toward English cements in general, as compared with the German brands. It should be remembered that the latter have not been very long introduced, and that the brands first put on the market here, the Alsen, Stern and Dyckerhoff, were probably at that time, even according to English expert authority, the best cements in the world. These cements came to us fresh, uniform, carefully packed, and of extraordinarily good quality, at a time when our market was flooded with English Portland cements, of a great number of different brands, some, undoubtedly, good, but many others bad, and rendered worse by the condition in which they were furnished. It was then the habit of the average dealer, a habit which average dealers have not yet forgotten, to pay no attention to the clause in the specification demanding a particular brand, but to deliver at the building a miscellaneous assortment of barrels, most of which bore traces of a long and arduous experience. A large part of the barrels, when opened, were lined with a crust, two or three inches thick, or more, within which was a bushel or two of undamaged material. Other barrels exhibited traces of cement of a certain color adhering to the inside, while the mass of their contents was of a different color, indicating that the barrels had been emptied of their original contents, and refilled with something else, the properties of which were unknown; and, with all, the suspicion was ever present that their contents might swell and spoil the work, as had often happened. The consequence of this was that architects, who, notwithstanding their injunctions, found that the crusts of damaged cement were pounded up in their absence, and used in the work, who waited in vain for the setting of cements of a good brand, which had become so air-slaked by age and improper packing as to be worthless, and who saw their carved brick-work, laid in such cement as the dealer had furnished, peeling away from the backing, conceived a dislike of the material, which has lasted until this day. At that time, engineers and architects of important buildings, if they had occasion to use large quantities of English Portland cement, felt it necessary to test a sample from every barrel, an operation which, if properly done, required a great deal of time, and expensive apparatus, and the introduction of the excellent German brands, delivered by the agent directly from the steamer, in barrels with waterproof lining, so that the cement was always in good condition, was a relief which brought these brands rapidly into use, not so much, perhaps, for their absolute merit, as through the certainty which the architect could feel that, in specifying them, he would get what he wanted. Now, as we are happy to acknowledge, just the same advantage can be enjoyed by specifying certain English brands, which are sold here by responsible agents, and the manufacture of cement in England is probably carried on as skilfully as anywhere in the world; but the prejudices derived from experience are slowly removed, and, even yet, the indescribable stuff that builders use to comply with a specification which calls for "Portland cement," without mentioning any particular brand, usually comes out of a barrel with an English name on it.

IT is a little curious that, with the increase and improvement of the Portland cement manufacture in this country, no attempt, so far as we know, has been made to produce a cement from the slag of blast furnaces. It is well known that, with ordinary iron ores, where lime is used for a flux, the slag drawn off from the surface of the melted iron, which is here generally thrown away, contains almost exactly the same elements as Portland cement, in nearly the same proportions. Many attempts have been made abroad to grind the slag, and use it as cement, but it is only recently that very promising results have been secured. In this case, however, either by grinding in a particular way, or, more probably, by adding something to the slag, the ground material is said to have shown all the qualities of a first-class Portland cement. As this country is now, we believe, the largest producer of iron in the world, and as cement is here in great demand, and comparatively high in price, it seems as if there was every inducement for trying to utilize the worthless and cumbersome slag from the furnaces in this way, and it is much to be hoped that suitable experiments may be made.

LA SEMAINE DES CONSTRUCTEURS quotes from a report of Mr. Foulger, the Chief Engineer of the London Gas Company, some rather startling information about the condition of the London streets. Many of the streets are paved with wood blocks, laid on a stratum of concrete, which forms a sort of arch across the street. This concrete has become very hard, so that it is quite capable of sustaining the traffic without the support of the earth beneath it; and it seems that, in course of years, the soil, which is loose and soft, has settled away from beneath it, so that, for example, in Oxford Street, it was found, in making some repairs, that a man could crawl in between the underside of the concrete arch forming the substratum of the pavement, and the surface of the soil under it. Except for the danger of a sudden collapse of the arch, this subsidence of the soil would not be a serious matter, were it not for the fact that the space between the concrete and the soil is found to be filled with a mixture of gas, which has escaped from the street mains, and air; and if the mixture should attain explosive proportions, which might easily happen, a short-circuit of an electric current, or an incautious excavation, might result in blowing the street into the air.

M. L. LANGLOIS, a well-known French engineer, delivered an address before the recent Congress of French Architects, on some new types of framed structures, differing from the ordinary sort in having the supports firmly fixed in the ground. It is hardly necessary to say that the average large building of the present day consists of framed roof-trusses, often very skilfully designed, supported either on high walls of masonry, which could hardly hold themselves upright if they were not tied by the trusses, or on slender

posts or columns, even less stable than walls. When a severe strain of any sort comes on such a structure, the walls or posts usually suffer. The trusses, it is true, often give way first, but any accident to them commonly brings down the wall or line of posts on which they rest. M. Langlois, observing that the vertical portions of ordinary buildings add nothing to the strength of the structure considered as a whole, but, instead of that, depend upon another portion to keep them in place, suggests that there is no difficulty in making the uprights an integral part of the structure, in such a way that, instead of being a burden, they add materially to the ability of the roof-trussing to resist either vertical or lateral strains.

EVERY one has seen the "arched girder" lattice roofs of our great railway-stations, and these will, by modification, illustrate the Langlois system of construction. Instead of lattice panels, forming a uniform curve, his structure is polygonal, consisting of latticed verticals, sustaining, and strongly connected with, roof-trusses of lattice or other design. The uprights are strongly bolted to concrete blocks, set in the ground, so that they present a strong resistance to horizontal strains; and, being of substantial lattice-work, they cannot buckle or bend under a vertical load; while, being braced and riveted to the roof-trusses, they form with them a frame of great strength, resembling much more the "bents" of a railway trestle-work than the usual combination of two tottering supports with a roof laid loosely on top. It is evident that a truss firmly braced at the ends to rigid uprights is under conditions of resistance much superior to those applicable to one simply supported at each end, but also very different, and the calculation of trusses so fortified is by no means easy. M. Langlois says that for a time he calculated the entire structure of this type as a polygonal arch, but the fact that the bases of the uprights are firmly secured in the ground complicates even this calculation, as no theory has yet been devised for elastic arches fixed at the springing; and he thinks that a new mathematical process must be worked out for such cases, but as all the unknown factors are on the side of safety, the principle may be followed without hesitation. M. Langlois has already built some important structures after his method, which is well worth keeping in mind by architects. Strictly speaking, it cannot be called a new construction, as the latticed uprights and overhead cross-pieces of a great railroad bridge, particularly of a draw-span, present almost exactly the same combination; but the application of this familiar engineering example to building design is, we think, new.

THE prospect seems to be that our great-grandchildren will know about the remains of the period known as Druidical, or megalithic, only through books, for the actual monuments of the period are fast disappearing. The estates containing the principal collections of Druidic stones in Brittany have been bought by the Government, but no provision is made for guarding them, and the ignorant and mischievous picnickers who visit them are allowed to do as they please with them. In England, the great monument of Stonehenge, which, if not so extensive as that of Carnac, is more perfect, is said to be now totally neglected by its owner. A few years ago, a man was detailed to keep order among the visitors, but this guardian is said to have been withdrawn of late, and there is nothing to prevent people from building fires under the granite colonnade if they wish.

IF Stonehenge and Carnac are fated to disappear from the earth, at least let some effort be made, before they vanish, to find out something of their real history. It is generally agreed that, far from having been built by the Druids, they existed ages before the rise of the Druidic system, but this conclusion only makes their origin still more obscure. It is said that the huge monoliths of the inner ring at Stonehenge are of a peculiar granite, no quarry of which exists nearer than Africa. If this is true, as we suppose it is, the transportation of these great blocks indicates not only a considerable development of the arts of navigation and mechanics among the people who brought them to England, and set them up many miles from the shore, but a connection, either religious or commercial, between Africa and England, to which recorded history gives no clue whatever. It has been said that monuments of the characteristic megalithic pattern are found not only in England and northern France, the Lyonnesse of the legendary period, but in the Southern Lyonnesse, of which the city of Lyons was the capital, and from there westward, along the Mediterranean shore, through Spain. It is said, also, that in Spain and western France these monuments, instead of being scattered thickly over an extensive tract, as in the two Lyonnesse countries, are found at intervals along a certain route, but not elsewhere, as if the people who built them were, in Spain and Provence, foreigners, passing frequently along an established route, as caravans pass through Africa or Tartary, and erecting the symbols of their religion only along the road which they frequented. No mention is, however, made in history of any race trading over such a route, or of any connection between what seems to have been two great Celtic communities, and still less is any clue given to the connection between these communities and Africa. In fact, there is internal evidence that the trilitha of Stonehenge were placed in position before the pyramids of Egypt were built, and if this evidence can be relied upon, the megalithic monuments belong to a period at least two thousand years anterior to that at which the first glimmerings of European history appear. What manner of men lived in England and France two thousand years before the Trojan war we may well be curious to know, and every indication that can be compared with other indications to throw light upon the question should be studied and recorded without delay.

A CATASTROPHE of an exasperating kind has deprived Mr. Burne-Jones and the public of one of the most notable of modern English pictures. The masterpiece of that eccentric painter is commonly considered to be his "Love among the Ruins," a mildly tragic composition, which has often been exhibited. A firm of picture-publishers in London applied for permission to make a photographic reproduction of the painting, for publication, and the application was granted. The picture was sent to the publishers, who put it into the hands of their workmen, and one of these coolly began operations by daubing it all over with white-of-egg. Mr. Jones is as peculiar in his technical methods as in his artistic style, and, as it happened, the picture in question had been painted with thick water-colors, instead of oil. A card, giving notice of that fact, had been pasted on the back of the picture, but the workman paid no attention to the warning, and proceeded with his treatment until he had washed off the more delicate touches, and smeared the faces and hands into an unintelligible blur. What depths of sentiment have been lost to the world by this untimely barbarity, probably no one but the artist could ever comprehend, but it is to be hoped that the public lamentation over the occurrence may be loud enough to deter photographers in future from amateur experiments with pictures entrusted to their care.

FOR some mysterious reason, it is the fashion now among ink manufacturers to make their ink extremely acid, so that a steel pen dipped in it immediately begins to dissolve, with effervescence, like the old nails dissolving in sulphuric acid, with which we produced hydrogen in our boyish days. What the effect of this corrosive acidity may be upon the paper of manuscripts, we will not undertake to say, but its well-known effect upon steel pens is to render them quickly useless. Long before they reach this stage, they become scratchy and unpleasant to write with, so that a method by which either the ink could be neutralized, or the pens preserved from its action, would save the nerves, as well as the pockets, of many a clerk or book-keeper. In regard to the ink, it is doubtful whether the chemical knowledge of the average clerk would be sufficient to enable him to experiment with advantage, but a writer in *La Nature* suggests that the pens may be to a considerable extent protected against corrosion by keeping them, when not in use, in a tumbler, in which is a damp sponge, resting on a substratum of carbonate of soda. The moisture in the sponge takes up a little of the alkali, so that, when a steel pen, wet with acid ink, is placed in contact with it, the acid of the ink is neutralized, and corrosion stopped. Of course, when the pen is dipped in the ink again, corrosion recommences, but the frequent interruption greatly prolongs the process, and lengthens the period during which the pen is serviceable.

OFFICE-HELP FOR ARCHITECTS.[1] — XXI.

SECTION VI. — DAMP AND WATER PROOFING:

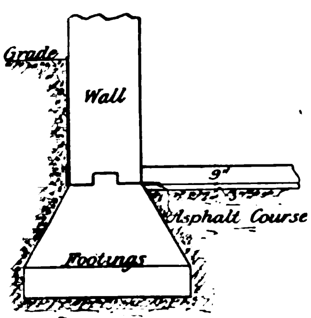


Fig. 100.

§ 282. Materials: — Portland cement, asphaltic felt, asphaltic mastic, paint, patented preparations.

§ 283. Portland Cement: *Damp-proofing:* — May be used to advantage to coat exterior walls of buildings above ground, after they have weathered four to six months, by mixing the Portland cement with water to the consistency of syrup, and applying one heavy coat with a whitewash brush. It effectually excludes moisture. A rendering of Portland cement one part, sand three parts, mixed stiff, and applied ½" thick to the outside of walls built on a sandy soil, will exclude dampness, but in a clayey soil, or wherever the drainage is poor, it will not be satisfactory. If sand or gravel is used for back-filling and drains are laid around outside, it will be all right.

§ 284. Paint: — Use three heavy coats of linseed oil and white or red lead, on exterior walls.

§ 285. Asphaltic Felt: — Wherever it is desired to make horizontal surfaces, such as cellar and vault bottoms waterproof, or wherever the soil has become foul from leaching cesspools, privy vaults and the like, it should be covered to the outside line, after the footings are in, with 3" of concrete. One course of the footings at the level of the cellar bottom should have a break put in it, and should be laid with three thicknesses of tarred felt in hot asphalt, the felt being permitted to project not less than 6" on each side.

Just before the completion of the building the entire cellar bottom should be completely covered with three thicknesses of tarred felt laid in hot asphalt, breaking joints, overlapping and making a tight joint with the felt projecting from the footings on the inside, and the outside of the foundation wall and footings should be similarly treated up to the grade line on the outside (Fig. 101). On the top of the tarred felt on the inside, there should be laid concrete 1" thick for each three inches in depth of the water above the level of the cellar bottom, with 6" as a minimum. The thickening of the concrete when it becomes excessive, may be dispensed with, if I-beams are bedded therein so as to stiffen the floor against the upward action of the water on the assumption that the pressure on the floor is at the rate of 60 pounds per square foot, per foot of the depth of the water.

For damp-proofing, two thick coats of hot asphalt may be used between the layers of the concrete. This affords an efficient means.

§ 286. Asphaltic Mastic: — Is the natural asphaltic rock, calcined, pulverized, melted and run into blocks and cakes. When used, it is melted in large kettles, mixed with a small proportion of coal-tar, and applied hot. It should always be applied by a company making a specialty of it.

It may be applied in two ways:

(*a*) Put between the courses of masonry or between two courses of concrete in the cellar bottom, and carried up the outside walls to grade; put on in two courses, and as long after the masonry has been set as possible, in order to let the mortar thoroughly set, as damp-proofing.

(*b*) Put on one coat, then while the mastic is still hot, lay one layer of tarred felt, making butt longitudinal joints, and lap transverse joints. Then put on another coat of mastic, then a layer of tarred felt, breaking joints over the layer below; then finish with a coat of mastic, as waterproofing.

§ 287. Other Materials: — Coal-tar, Portland cement and paints of various makes are all fairly efficient as damp-proofing, but do not give the satisfaction that asphalt does.

Caution: — Every damp-proofing material should be placed as near the outside of the wall, or other construction intended to be damp-proofed, as possible.

SECTION VII. — MACHINERY FOUNDATIONS:

§ 288. General: — Vibrations, no matter how slight, if long continued, will almost certainly result in the disintegration of masonry, it is, therefore, necessary in putting in foundations for machinery, to provide against it as far as possible.

§ 289. Materials: — Foundations proper should be made of concrete, as giving greater weight per cubic foot than brickwork.

Deadening to absorb the vibrations, should be sand, creosoted yellow-pine, hair-felt, mineral-wool, or asphaltic concrete.

§ 290. Uses: *General:* — Sand, gravel, soft earth or silt, will transmit vibrations very poorly. Firm earths will transmit quite well and rock perfectly.

It is necessary then that in sand or other soils of poor transmission, to be assured only that the foundations of the machinery shall be at least 2′ 0″ away from all other foundations, unless the vibration be very marked. In firm earth, it is well to excavate a pit at least 4′ 0″ wider and 2′ 0″ deeper than the foundations are intended to be, fill-in with 2′ of sand, build foundations, and then fill the balance with sand. When this cannot be done, start foundations on a crib of 2″ x 12″ yellow-pine plank (one course thick) and make the capping of the foundation yellow-pine timber bolted together; fill-in around foundations with sand. If founding on rock, or if the vibration bids fair to be excessive, use one of the following methods:

(*a*) Make lower 12″ of foundation of asphaltic-mastic concrete, having the work done by some reputable company. Finish with concrete and cap with bluestone cap.

Surround the asphaltic concrete with a non-conducting covering of either porous terra-cotta slabs, mineral-wool, or 4″ hollow blocks or sand, as the foundation will soften and run at a temperature of 130°.

(*b*) Excavate a pit into the rock about 6″ deep and fill the same with hair-felt or mineral-wool. Build foundation on that.

(*c*) Excavate pit 2′ in depth, fill with sand and start foundations, the pit being protected against the inflow of any water.

(*d*) Found on 12″ yellow-pine timber creosoted.

§ 291. Remarks: — High-speed engines, if in the least unbalanced, will set up a vibration that, if synchronous with the fundamental note of the building, will cause it to rattle dreadfully; to remedy: make the foundations so as to absorb the vibration as far as possible, and change the speed. Pumps when working irregularly may often set up a very bad knocking. To cure this, the pipes should be supported from the foundations as far as possible, making the foundations as above described, and a springy packing of asbestos-felt, rubber, leather, etc., placed between the hanger and pipe wherever necessary to put hangers.

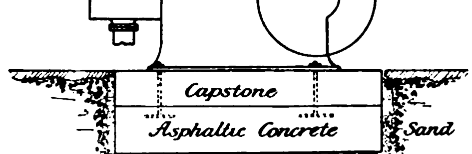


Fig. 101.

[1] By George Hill, Consulting Engineer. Continued from No. 929, page 20.

ABBREVIATIONS AND SYMBOLS.

$=$ equal to.
$\parallel$ parallel to.
$\div$ divided by.
$\times$ multiplied by.
$+$ added to.
a^2 a multiplied by itself.
$a > b$: — a greater than b.
$a < b$: — a less than b.
$\frac{a}{b}$: — a divided by b.
$\therefore$ therefore.
□′ square feet.
□″ square inches.
8# read 8 pounds per lineal foot.
[channel bar.
I I-beam.
T T-iron.
L angle iron.
⊥ deck beam.
● round section.

I ton = 2,000 pounds as this is the conventional ton, the legal ton is 2,240 pounds, but is rarely used.
l = the length between supports of any beam or girder or height of any column, always in feet.
b = breadth of any beam or girder, always in inches.
d = depth of any beam or girder, or the least transverse dimension of any column, always in inches.
L = total load uniformly distributed coming on any piece in pounds.
$L^{\square'}$ = " " " " per square foot in pounds.
W = concentrated load on any piece in pounds.
s = span of any arch or truss between centres of end pins in feet, or spread of footing courses.
A = area of any section in square inches.
M = maximum bending-moment in inch pounds.
n = distance of centre of gravity of section from either top or bottom edge in inches.
I = moment of inertia, neutral axis through centre of gravity.
R = moment of resistance of section.
r = radius of gyration, in inches.
Sc = safe compressive strain in pounds per square inch.
St = " tensile " " " " " "
Ss = " shearing " " " " " "
S = strain per square inch in extreme fibre.
P_e = upward reaction of support at left-hand end of beam.
P_f = " " " " " right " " " "
e = distance of centre of gravity of load from left hand of beam.
f = " " " " " " " " right " " "

The pump foundations should also be built to take up the vibrations as much as possible.

The location of all machinery having reciprocating or rotating parts, should be carefully studied, and any possible vibrations guarded against.

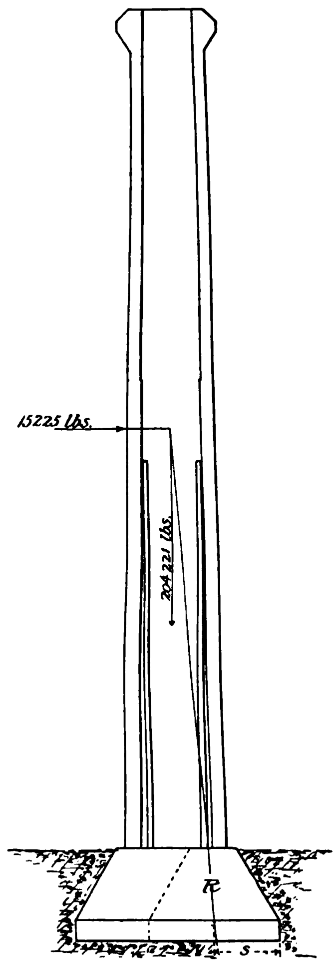


Fig. 102.

Foundations, generally, should be capped with planed or rubbed bluestone caps of thickness $= \frac{1}{2}$ width. The location of all necessary bolt holes and the proper size of foundations can be obtained from the contractor furnishing the machinery. In size, the two vital things are, the weight and the spread; the sections making but very little difference.

In building, always provide gas-pipes 2″ larger in diameter than the foundation bolts, and slip them in over the bolts before concreting. When the stone is ready to set, fill the hole with grout.

Insist on the machinery contractor furnishing wooden templates of sufficient strength to carry the foundation bolts and have him set them in place so securely that nothing short of the destruction of the template can disturb them.

Before finally deciding on a foundation lay-out, have the machinery contractor examine it, and give a guaranty against any vibration. He may tell you that you have gone to unnecessary lengths; but do not change, unless you know by experience that he is conservative and well informed.

SECTION VIII.—CHIMNEY FOUNDATIONS:

§ 292. Material:— Concrete in mass or brick in cement.

§ 293. Design: — *For ordinary stacks* in houses, the same spread that is given to the walls, will do for the chimneys.

For large heavy stacks in houses, the weight of the chimney should be computed, and the footings proportioned accordingly. In computing weight, take

$$\frac{\text{Length} \times \text{Breadth} \times \text{Height}}{20}$$

as the total weight in tons.

For the bearing value of the soil, use $\frac{3}{4}$ the value given in Table XXIX.

For boiler chimneys a new factor comes in, in the wind-pressure, which at times concentrates the load of the entire chimney practically on the inside edge of the outer chimney wall.

The foundations must, therefore, be proportioned to resist the entire pressure at one point, and then be made symmetrical on all sides. That is, if $R =$ the resultant pressure due to wind and weight in tons, the projection S must be equal to

$$S=\left(\frac{R}{3B}\right)^{\frac{1}{2}} \qquad (78)$$

Great care must be exercised in laying up the masonry, as very severe strains will at times come upon it. (Fig. 102.)

SECTION IX.—SHORING:

§ 294. General: — Shoring will only be treated generally, since each town or city usually has some men or firm who confine themselves to this class of work, and whose method of work will generally be found satisfactory.

§ 295. Shoring: — Is supporting a wall while its foundations are being carried down or strengthened in sections by means of inclined posts (See Fig. 103) which rest in sockets cut into the wall at their upper ends, and rest on a timber crib at their lower ends.

The shores should be put in so as to support the walls as low down as possible, and another row as high up as possible. The inclination from the vertical should not exceed 20°. Shores should not be more than thirty times longer than least dimensions. Should be placed for the support of all piers, chimneys, etc., and generally about 10′ 0″ apart.

Area of shore in square inches, (L in tons)

$$= 2.5\, L\, c \qquad (79)$$

Area of crib under shore

$$= \frac{1.33\, W}{B} \qquad (80)$$

Shoring should be used when the soil is quite firm, and will stand vertically three or four days; when it is undesirable to go through the wall and occupy the adjoining cellar with temporary works; when the depths to which the foundations are to be carried down, does not exceed 6′ 0″. Make the recesses such that the bearing area at the top equals $\frac{1}{2}$ area of shore.

Build the cribs, put shore in place, and bring it to a bearing with hard-wood wedges. As soon as three pairs are in place, excavate a section of the new footings as described under § 298 "Underpinning." As fast as the underpinning goes in, move the first pair of shores along, always having two pairs supporting the wall and working under or with one pair.

§ 296. Needling: — Is supporting a wall on transverse timbers, the ends of the timbers supported on cribs, and with screws between the crib and the timber supports, so as to bring the timbers to a firm bearing under the wall. (Fig. 104.)

Used: — When the depth of the new footings is greater than 6′ 0″ below the old; in soft soil; when the weights of

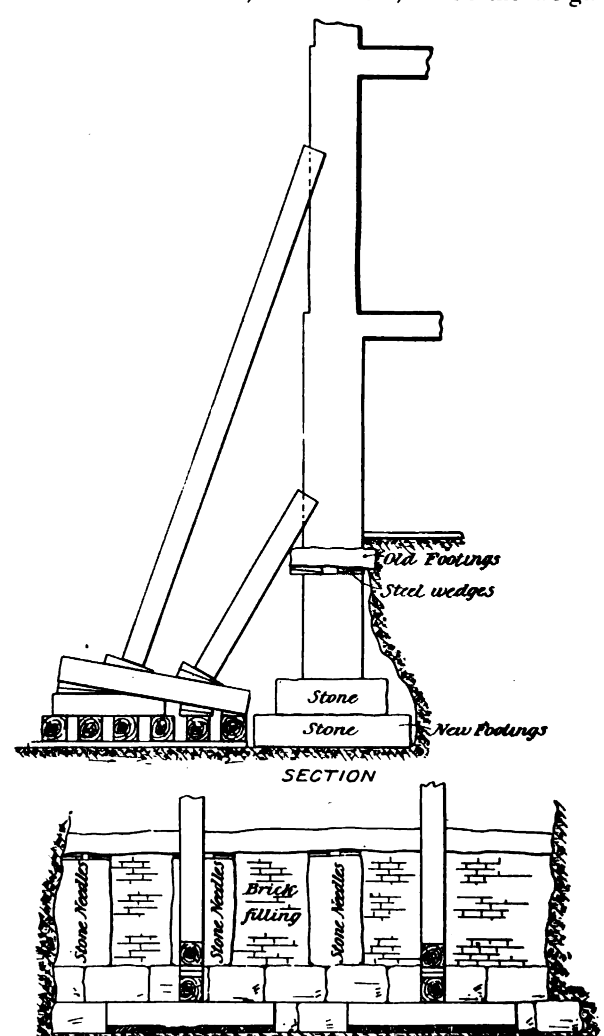


Fig. 103.

floors and walls exceed 15 tons per lineal foot; when it is practicable to occupy the adjoining cellar.

Procedure: — Calculate W carefully. Dig pits for the cribs to the depth of the new footings, of area required to carry the

computed load; cut holes in walls through which to pass the timbers; calculate necessary size of timbers considering them as beams loaded in the middle, and supported at both ends. Timbers should not exceed 10′ 0″ distance apart, *c* to *c*, and should go under all piers and chimneys.

Then build up crib of 12″ × 12″ timbers, put in a pair of jack-screws at either end of a transverse piece to support beam; put in transverse pieces, put in beam and screws, screw up the jack-screws until the wall is supported entirely by the timbers. Then excavate and underpin, and when all is set, remove the needling and fill-up the holes.

§ 297. Bracing: — Whenever a building is torn down, so as to leave the neighboring walls unsupported, they must be braced against falling-in by means of spreading braces, or long shores inclined at about 45°.

Procedure: — When there are walls on both sides, put in 8″ × 8″ spreading braces 15′, *c* to *c*, at the height of every other tier of beams.

Braces must be put in with wedges to secure a bearing, and must be supported at one end by means of posts coming down to the foundations, and put in at a slight inclination, so as to secure them more firmly in place, in the event of shrinkage. They should also be slightly stayed together with shingle lath horizontally. If the spans exceed 25′ the timbers must be made correspondingly heavier.

When the walls step back, the lower end of the brace may rest on a step, and so dispense with a vertical brace.

Fronts should be braced with heavy spreading-braces, say 8″ × 10″ at each story, and if there are arches in the adjoining buildings, the braces must be proportioned to take their thrust.

§ 298. Underpinning: — Two methods: (*a*) Granite posts. (*b*) Brickwork in cement.

(*a*) *Granite Posts:* — Used where distance from bottom of old footings to top of new does not exceed 5′ 0″. Build new footings as before described. Then provide a number of granite posts of length sufficient to reach from old to new footings, square and of thickness = thickness of walls, top and bottom surfaces dressed truly.

Insert under old wall with top and bottom in full bed of Portland-cement mortar.

Bring to a bearing with steel wedges.

These granite posts should occupy one-third the area of the underpinning; the space between them should be filled with brickwork in cement mortar. If bottom of old footings is rough, or soft brickwork, make the posts 6″ short, put in a 5″ bluestone slab, square and of width of old footings, with plenty of mortar on top, and then wedge up between the slab and granite post.

(*b*) When the height exceeds 6′ 0″ build up the underpinning with hard brick in cement-mortar, getting a bearing on the old work, by means of two 5″ bluestone caps, square, and made of width of old footings, wedging between them

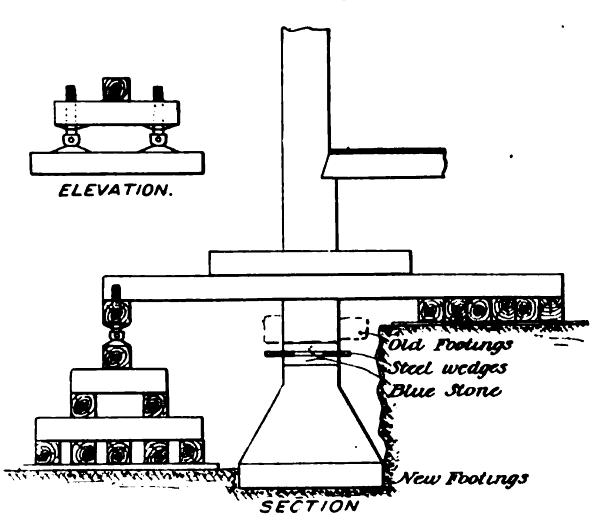


Fig. 104.

with steel wedges. These caps should be placed a distance apart in the clear longitudinally = their own width.

Then build-up between in similar manner, wedging up the last joint with slate. After the work is completed, grout the space between the caps with Portland cement well rammed in. The underpinning should closely follow the work of excavating and building footings, so as to require the support of the needles or shores the shortest possible time consistent with having the cement set before weight comes on it.

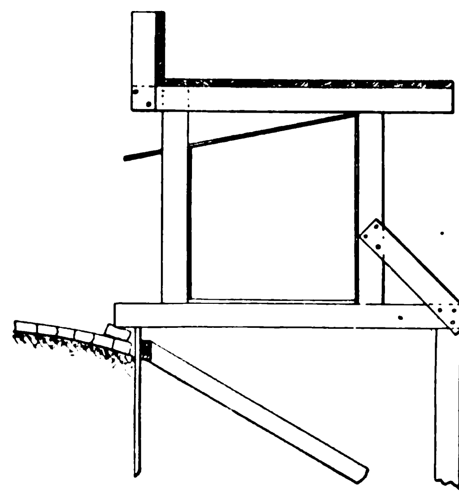


Fig. 105.

§ 299. Tearing-down: — Should be done by men making a business of it. Before work is started, a heavy roof should be put over the sidewalk, made of bents 8″ × 10″ timber, spaced 8″ to 10″, *c* to *c*., and roofed with 2″ × 10″ plank with 2′ 0″ plank parapet, and then a water-tight board roof put 2′ 0″ below it. (Fig. 105.) A dust-chute should be made of tongued-and-grooved boards and provision made on each floor for sprinkling continually.

All pipes should be cut off at the entrance to cellar, gas-pipes cut and plugged. Electric wires, etc., removed. Tearing-down should be so conducted as not to jar adjoining buildings. Rubbish should be passed down the chute and loaded directly into tight carts, or else lowered in baskets into carts, sprinkled before lowering, and as soon as deposited in the carts. All timber, stone, brick, and iron should be removed as soon as a truck-load is collected, so as to leave the site clear as soon as the tearing-down is completed. Rubbish should not be permitted to collect on a floor, and then shovelled off into the cellar through a well-hole.

[To be continued.]

ON THE USE OF COLOR IN ARCHITECTURAL DESIGN.[1]

IT is hardly beyond the truth to say that, so far as the exterior of buildings is concerned, there has been until recently no use of color in architectural design since the close of the sixteenth century in Italy. And even now, though some attention has of late been given to this subject, both here and in Europe, which has produced some successful color design, the most striking fact with regard to our use of color in architecture is probably our timidity. This modest caution in the first unwonted essays at color treatment after so long disuse is certainly wise and right, since too great boldness in this matter is more likely to lead to failure than success. But the possibilities of the use of color in architectural exteriors and the right treatment of it certainly demand more serious consideration than they have generally received. To treat the exterior of a building in a single material and in absolute monotone, is doubtless the safest procedure, and is vastly preferable to an ambitious but faulty color-scheme. But it is clearly to give up one important source of beauty in architectural design.

Ruskin in a characteristic passage in his "*Seven Lamps of Architecture*" thus expresses his opinion on the subject: "I do not," he says, "feel able to speak with any confidence respecting the touching of sculpture with color. I would only note one point, that sculpture is the representation of an idea, while architecture is itself a real thing. The idea may, as I think be left colorless, and colored by the beholder's mind; but a reality ought to have reality in all its attributes; its color should be as fixed as its form. I cannot, therefore, consider architecture as in any wise perfect without color."

In this opinion most architects nowadays will probably concur, though monotone is still largely the rule in the exteriors of our buildings, and there are not wanting those who maintain that it is the ideal and the only dignified treatment. Such a view, however, receives but little support from the authority of the past. Most ancient buildings, it is true, are of one color *in their present condition*, and our architectural ideals are doubtless largely formed by the noble buildings of the past *as we have seen them;* yet we know that when their builders left them most of them were glowing with color.

To recall briefly the history of the color-treatment of buildings will show the extent to which color has been employed in architecture.

The columns and walls of the Egyptian temples were covered with rich color-decoration which in most instances still remains to this day. The capitals, which borrowed their form from the lotus

[1] A paper by H. Langford Warren, architect, prepared for the Annual Convention, A. I. A., but read before the World's Congress of Architects at Chicago.

flower or bud, were painted in red and green and white, with ornaments closely imitated from the same plant. The shafts were similarly decorated in color or with hieroglyphs incised and painted. If most of this color is to be found in the interior of the temples, it is because the architecture itself was mainly internal. But little external architectural effect was sought in Egyptian temples until a comparatively late date, except about the entrances, and these were always decorated with color.

In Greece, the marble of the temples (or the fine stucco which covered walls and columns where a coarser stone was all that could be obtained) was regarded as a field for ornamental color-treatment. Indeed, the marble seems to have been chiefly prized for its excellent surface for color-decoration. The Greek temple did not stand out entirely white against the blue sky, as we are apt to picture it to ourselves, but was a glowing mass of color. Since the days of Hittorf's color-restorations this is no longer matter for conjecture, but has been clearly proved by the numerous colored fragments and traces of color which have been found. Mr. Edward Robinson has recently fully shown, both by literary evidence and by traces of color which he has found, that even the statues were fully colored in a somewhat conventional manner. The Romans, heirs to the arts of Greece, followed the same methods. The well-known statue of Augustus, for instance, retains such complete traces of color as not only to show that it was entirely painted, but to make an accurate restoration of the color possible. But in the decoration of their buildings the Romans seem to have used applied color much less than the Greeks. Instead of this they obtained their color-effect by the use of variegated marbles and precious stones, though applied color was used, especially when expense precluded the use of the more precious materials. The use of applied color in the provincial towns has been made familiar to us by the discovery of Pompeii and Herculaneum. And similar treatment was employed in many buildings of Rome itself; though here in the more important public buildings, columns were made of porphyry, verde antique, and rich marbles from the East, and variegated marble was used in slabs as a covering for the walls. Gilding was also lavishly employed in capitals and other members. This method of obtaining color-effect by the natural color of rich materials continued in the Byzantine empire, which added to it the use of mosaic. (The marvellous church of St. Mark at Venice is the most familiar and the most beautiful example of this style). And it continued in Italy through the various styles that followed until the later Renaissance.

The mediæval architects of the northwest of Europe did not have these richly-colored materials at their command, but they were far from giving up on that account the use of color. The very fact of the fairly complete preservation in which the great cathedrals have for the most part come down to us, so far as their general form is concerned, makes especially difficult to us the realization of what their appearance must have been when they still had all their color-decoration. But enough traces of color are still clearly visible to show their original condition with tolerable certainty. In a general view, these venerable buildings seem to have no color but the natural gray of the weather-beaten stone, — no more variety of tint than can be found in some old cliff of which their walls so much remind us, stained and worn as they are by time and with weeds and brambles growing in their crannies. But if we carefully scrutinize the hollows and protected portions of the carvings, especially in the porches, we shall almost certainly find unmistakable remains of applied pigment. Especially is this the case, for instance — or was before the restorations — in the porches of the Cathedral of Amiens, where the pigment used on the moulding of carved roses and of the hawthorne in its natural colors could still be plainly seen in places. The most striking and complete example of mediæval color-decoration on the exterior of a building I have seen and noted is to be found at the Church of St. Martin at Laon, in the central porch of the west front — which dates from the fourteenth century. Enough remains to show that this porch was completely covered with color. The columns and arch-mouldings were painted in red and yellow chevron stripes and similar patterns, which can be clearly traced. In the tympanum are carved two angels swinging censers on each side of a figure (probably of Christ or of the Virgin) which has disappeared and which stood on top of the centre mullion of the door. The angels' wings were gilded and their robes were tinted. The background was filled-in with other painted angels, and the under side of the tabernacle roofs over the figures in the porch was painted blue. These colors and other similar remains are quite crude. What the general effect of this treatment must have been in an interior, one gets a clear and undoubtedly substantially correct idea from the restoration of the Sainte Chapelle at Paris, especially in the upper chapel. In the interiors the remains of color are more frequent and in better preservation, as would be expected, and are especially to be noted in the chapels and on tombs and rood-screens. A very interesting and complete example of color applied to interior architecture is to be found in the rich late Romanesque porch now walled-up, on the north side of the Cathedral of Rheims.

It is clear that one should picture to himself the completed cathedral of mediæval France as richly decorated with color inside, besides the stained-glass windows; the color overflowing, as it were, and covering the porches, which were probably entirely covered with rich coloring. Color was, it seems likely, also, more sparingly applied to other portions of the exteriors.

The interiors of the cathedrals of Italy at this time were also fully decorated by applied color; for mosaic, which had been introduced from Byzantium, fell more and more into disuse as fresco painting developed. But in the exteriors, in connection with colored marbles, which as we have seen were principally relied on for color, mosaic continued to be used as in the gorgeous fronts of the cathedrals of Siena and Orvieto. With the coming of the Renaissance, mosaic becomes still more unusual. But colored marbles were never used with more delicate taste or more beautiful effect than they were by the architects of the early Renaissance in Italy, and there are few classes of buildings so fruitful of lessons in the right principles of the application of color to buildings. The little Monte di Pietà and the Palazzo Publico at Brescia, or Fra Giocondo's loggia at Verona, (in which sgraffito is also employed,) or the Ca' d'Oro, or Ca' Trevisan at Venice, may be named as examples of these.

With the further advance of the Renaissance, color gradually disappeared from the exteriors of buildings, first in Rome and Florence, later in Venice, whose delight in color led her, while other cities were already contenting themselves with monotone, to cover even the exteriors of her buildings with paintings by Giorgione, Veronese or Sebastiano del Piombo, the faded remnants of which may still be dimly seen on her walls.

In this rapid survey, no mention has been made of the styles of the East or of the Moors in Europe, styles essentially dependent upon color for their beauty. Attention has been purposely confined to those styles which have been developed in, or have directly influenced western Europe.

What has been said recalls enough of the history of color in architecture to show clearly, that the later and especially the debased Renaissance is the only style which until modern times, has attempted to dispense altogether with color as a means of architectural effect and that in most styles color has been regarded as of essential importance, the apparent exceptions being due, until the time of the central Renaissance, to lack of means rather than to preference.

In the face of this unanimity of opinion and of precedent, it would be difficult to argue in favor of a general use of monotone in the exteriors of buildings. The strength of argument lies however altogether in favor of the employment of color. But it must be confessed, that many of the recent attempts at external color-treatment are far from successful. Such use of color is as yet new to us and it is not matter for surprise that there should be some bungling. Especially to be regretted, for instance, is the placing of color emphasis on the quoins at angles and on window and door jambs. This treatment was first, I believe, brought into prominent use by the late H. H. Richardson and has since been much imitated; but like most great men it has been Mr. Richardson's fate to find more imitators of his faults than of his good qualities.

In view of the growing desire for color-treatment and its difficulty, a statement of the principles which should govern color-design in architecture is often asked for.

In the first place, it must be said that there is perhaps no subject more difficult to consider by means of *words*, inasmuch as almost any color-scheme which it is possible to describe in words, can be made harmonious and perhaps beautiful in the hands of a true artist, or may be discordant and ugly, arranged by a person without color-sense. The delicate variations and the proportioning of one color to another which make the difference between beautiful and unpleasant, are too subtile to be described in words. In the next place, while the color-sense may undoubtedly be trained and strengthened by proper instruction and by observation and practice, yet it is useless for any one without that inborn color-sense to undertake to have anything to do with it. So that of color more than of any other object of study, the paradox is true that instruction is unnecessary for those that are gifted and useless for those that are not. Finally, while for the reasons above given dogmatism with regard to color is especially out of place (for a master will upset all rules), yet there is perhaps no subject more difficult to treat without dogmatism, since it is too subtile for argument, and conclusions with regard to it are necessarily based on observation and experience, guided by taste and feeling — not by reasoning. So much premised, a few general principles may be stated as marks to shoot at.

The first principle I feel inclined to lay down is that any theory of color-design, taken as a guiding rule for practical work, is certain to be fatal to the result. What horrors have not been perpetrated in the name of the old theory of the primary colors, red, blue and yellow, with their secondaries, tertiaries, complementary colors, and what not; a theory which to be consistent would have us refuse to see any beauty in the colors of a peacock's tail or a forget-me-not. But this theory has been exploded. Very true; but as a guide to color design the Jung-Helmholtz theory is not much better. It can to some extent analyze and explain, but it cannot construct, and an artist is not concerned with analysis and explanation, but with creation and enjoyment. Ruskin's theory that the *principles* upon which nature applies her color must be right, and that therefore color as applied to architecture must not follow constructive lines, because in nature it does not (as in the tiger-skin), would, logically followed, lead to absurd conclusions.

Furthermore, the different styles demand different color-treatment, so that general principles are the more difficult to lay down.

In approaching the study of color, let us then clear the ground by getting rid of all theory at the outset, and let us follow our sense of what is beautiful.

In what has been said above it is not meant to imply that nothing

is to be learned from nature for our color treatment of architecture. A few broad principles we may perhaps glean from her, but our essons will be for the most part in learning what is beautiful, rather than by opportunity for deducing receipts or theories. The English architect, E. L. Garbett, in his little book on design, mentions one of the few general principles it may be safe to deduce. "In nature" he says "sameness of coloring is the rule, variety the exception; the former being found in all large or grand objects and broad surfaces, and the latter only in small and scattered organisms." A general law is no doubt here pointed out — by "sameness of coloring" Garbett cannot of course mean absolute sameness, but the sameness of a green tree where the whole is green, but there is great variety of green in the individual leaves; or of a gray cliff, where the whole is of one prevailing color, but with much variety of shade and tint within certain limits. But the principles here indicated in so far as valuable as guides in color-design, are so not because we find them in nature, but because we see by observation that they apply also to art. A small building may, if you please, be a glowing mass of color; but a large one, all of vivid and varied color would be tiresome: to have dignity and impressiveness it must have one dominant prevailing tone. This may be seen by comparing two such buildings as the duomos of Florence and of Pisa. The Pisan color is much pleasanter and gives greater dignity of effect on account of its broader massing. The building is mainly of one color (white marble, now a rich gold with age) with mosaic patterns of various marbles in tympana and spandrels, while the Cathedral of Florence is checkered all over with colored marbles — dark green, white and reddish brown. The dominant color must be selected with the greatest care with regard to the surroundings of the building and the colors of adjacent objects of whatever kind with which it will come in contrast. This is a point too often not enough considered in the choice of building material. But this dominant color will not be of absolutely uniform tint. If there is to be any beauty of color there must be some variety, as in the leaves of a green tree where light and shade add to the variety of local color, or in a cliff, or mountain-side, or pebbly beach. If stone is used, the different blocks will not be accurately matched in shade, but will be so placed as to make slight contrasts in tint between the different blocks. If the structure is brick, the brick will not be culled, but used with all the accidental variety the kiln affords. No surface could well be uglier than the respectable brownstone front, or the wall of culled red pressed brick. Indeed it is strange how when travelling in Europe, we can admire the variety of color in old brick and stone walls, and tile roofs, and then when we return home, continue to build with the utmost monotony of tone our great mechanical skill can attain, and proceed to wonder why our wall-surfaces are lacking in beauty. The dominant shade may be further varied by delicate contrasts of other material in friezes, or spandrels, as is so beautifully done in the Cathedral of Pisa or the Palazzo Municipale at Brescia already referred to.

If vivid color is to form a part of the scheme, it should be mainly confined to the recesses of loggias and porches, and should be focussed at some one point — for instance about the entrance — which should form the key and climax of the whole design. But the mistake is often made of supposing when color treatment is mentioned that vivid color is necessarily intended. Every building necessarily has its *color*, whether vivid or subdued, greatly varied or largely in monotone, and this color should receive careful study and consideration, and should not be left to be decided by accident, or by the whimsies of inconsiderate building-committees. Indeed, the whole design should from the outset be made with a certain material and a certain color-treatment in view. The fact that the color-scheme may seriously affect the apparent proportions of the building is often overlooked.

Whether the color of a building should be natural or applied, will necessarily depend largely on circumstance and on climatic consideration. The climate indeed, and the kind of light it brings with it, is of the utmost importance as a determining influence in the color-scheme. In our climate there can be no doubt that we should depend for our color largely on the natural colors of materials, applied color and rich decoration being confined to porches and loggias, as has been so effectively and, for the most part, so beautifully done in the World's Fair Buildings.

Another principle too often overlooked is that, as Ruskin has pointed out, a certain mystery is necessary to perfect beauty and delightfulness of color. There must be constant change. The eye must be continually confused. Anything like mechanical regularity inevitably injures the effect. Thus in using stones of different colors in the decoration of a building in bands or patterns, one color should be allowed to run over somewhat into another. Thus in decorating a wall with bands of color — say red and white marble, for instance — let occasional white stones find their way into the red bands and occasional red stones into the white. In the same way in using diaper patterns, let the pattern be broken by allowing the ground color to run into the bands, that is, let the bands occasionally disappear. This treatment will often be noticed in old English and Dutch brick diapers and can be seen in the front of the Ducal Palace at Venice. Or if bright-colored stones are used between the brackets of a cornice over a dull-colored wall, as at the Palazzo Publico at Perugia, let some of the spaces between the brackets be filled with the wall color. In all these cases care must be taken not to lose the pattern; the eye must always unconsciously complete it.

Another principle seems to be that the contrast between two colors, used in anything like equal quantities, and either in large masses or pervading a whole design, must never be great. They must harmonize, as dull red and brown, greenish or purplish blue and gray. The vivid and strongly contrasting colors must only be used in small points to give value to the whole composition, and on the judicious use of these small points of bright color will depend the brilliancy and beauty of the whole. A single point of color may change a whole color-scheme, may ruin it or may give it just what it lacked. Thus a point of light red may make a gray wall look blue by contrast, or it may make a brownish-gray look red by sympathy. The effect of the stronger colors in changing the apparent color of duller hues placed near them is a matter always to be carefully considered, and is one of the things which makes color-composition so difficult if not guided by that unerring instinct we speak of as "a strong color-sense."

The marking of jamb-stones and quoins has already been spoken of as a thing to be avoided. Jambs and corners are essentially part of the wall, and should not receive a different color-treatment. In general, the common practice with us of making the trimmings uniformly of one color and the rest of the work uniformly another is rarely effective and is generally a thoughtless or indolent subterfuge to avoid the serious study of color-treatment, or to disguise inability to handle it. There can be no such rule-of-thumb for arranging the color of a building. It must always be a matter of feeling and of separate feeling in each case. But feeling always, rather than thought. Good color can never be worked out like a mathematical problem.

Of late the perfecting of enamelling of terra-cotta and the richness of color obtainable in blocks of all sizes in this material, opens a new and rich field for color design. But it comes with danger in one hand, though with promise in the other, and its rich possibilities will need to be used with reserve and caution if they are to lead to success.

The safe rule is, if you are a colorist, use color freely — indeed you cannot help doing so when opportunity occurs. If you are not, have as little to do with it as may be.

THE GREAT EXHIBITION REVIEWED.[1] — IV.

THE FUTURE OF JACKSON PARK.

THE World's Fair of 1893 has made the name of Jackson Park to be known throughout the civilized globe. On January 1, 1894, by contract with the World's Columbian Exposition it will again be thrown open to the public. But the people of Chicago, who own it will find it something very different from what it was when it was given for the use of the greatest of World's Fairs in 1891. Then it was one of their pleasure-grounds and their favorite picnic-ground. It is not generally known outside of Chicago by the millions who have visited it during the present year, what it was before the Great Fair. Neither do they know what is meant by a Chicago picnic. Many have been led to believe that the whole area was a barren waste which has been reclaimed by the experts in science and art of the World's Fair to prepare it for the erection of a temporary city. It comprises an acreage of about 600 acres, or nearly a square mile, of which, however, eighty acres at the north and narrowest end had been completely improved as a public park for many years. The east frontage on Lake Michigan was finished with a beach paved with block stone, which had been found to be the only material that could resist the incursions of the lake in stormy weather. Inside of this was a broad concrete paved promenade, and inside of the latter a broad macadamized driveway. Previous to turning over the park to the Exhibition it had been decided by the Commissioners to continue this beach, promenade and driveway to the south end of the grounds more than a mile in length with such inlets to the water-ways of the park as the general plans indicated. It was part of the agreement between the Park Commissioners and the Exhibition that this water-front treatment should be carried out without interruption, and the Commissioners completed the improvement in ample time for the erection of the Exhibition buildings. So when these are removed the people will find a new and magnificent promenade on the lake front, which they have only known as part of the exhibition. But they will find their favorite picnic-ground almost ruined; whether to be used as before or not remains to be seen; for custom regulates these things. During several years before the World's Fair period the urban picnic had grown to be a prominent feature of city life during summer months. The parks gave the people facilities for this sort of amusement wherein the expense and annoyances of rides to any distance by car or boat were avoided. The Commissioners of all the parks encouraged them, and it has been to the credit of the liberal management of all the parks that the public have always had the freedom of the lawns, a freedom they have not abused. In fact the Chicago parks have always had the best lawns of any parks in this country notwithstanding their liberal use. The picnic has been one of the features of city life in summer-time and has always taken on an *al fresco* character, and has become so common as to be unnoticeable — for frequently a dozen picnics have been seen on the same green, ranging from the family affair of father, mother and children,

[1] Continued from No. 930, page 34.

to the more elaborate festival of some Sunday-school or charitable society.

It has been noticeable that during the past summer the usual number of picnics in Washington and the other parks has diminished, and it is fair to presume that the greater attraction of the Fair for those who have had leisure hours has been the cause of this. Whether or not, as a consequence, the people being now accustomed to more exciting recreations, those of a more quiet nature will fall into decline, remains to be seen. It would be a result to be deplored if they should. It is, therefore, desirable that the Park Commissioners should do all that is possible to restore to the people their play-grounds which have always been most in favor at Jackson Park, where they could enjoy the breezes of the great lake that they like so much to look at, even though they have little affection for it as a field for sailing. The coolness of the lake-shore in summer in contrast with the heat of the interior country will always be an inducement to Chicago people to stay at home as well as to others to visit it, while those of other cities fly to the hills or sea-shore. Our park-system, especially as shown in Lincoln and Jackson Parks is calculated to encourage this; and Jackson Park will hereafter be the objective point of every visitor to Chicago, if not to find some visible trace of the great Exhibition, at least to see the spot where its glories were unfolded. It is, therefore, desirable that it should retain such reminiscences of the great event as will not curtail the use for which it was always intended. To make clear how this may be done, a brief description of what it was may be appropriate.

Jackson Park is the terminal point for all who drive through the South Park System, and is now reached also by the best methods of transportation in the world. The Midway Plaisance has always been one of the routes to it, and the favorite one for those who drive. After going the rounds of Washington Park, those who ride used to go east on 60th Street along the north side of the Midway to Woodlawn Avenue, then by a road with four curves across the Midway to 59th Street and east on 59th Street to Jackson Park. This was the only way to reach it from Washington Park. But hereafter the driveway between the two parks will be the broad road built by the Exposition through the centre of the Midway. According to the plans adopted by the Commissioners twenty years ago, this was to have been a water-way; but it is hardly likely that they will throw away such a valuable improvement when no other connecting park road now exists. The Midway will be as now a street, and some means of improving the frontages must be devised. Lawns, paths, trees and flower-beds will cover the ground now occupied by many buildings which are hideous by themselves. It will be a continuous park, between two streets. The centre road will be devoted only to pleasure driving, while the street roadways will be relegated to business purposes. With the Midway buildings removed, and the fences torn down it will be found that already many fine buildings have frontages on this new park boulevard, where none were before. Some permanent hotels and many fine apartment-houses have come into existence on these streets while the Fair has been in a formative condition. The new Chicago University which will eventually occupy two blocks on the north side has begun its existence contemporaneously with the Fair, and already has several buildings of dignified and artistic design completed.

Two years ago the Midway was unused ground, half covered with a native grove of dwarf oaks, half with an abandoned nursery, and only crossed at one place by a primitive road. It will come out from the Fair with more improvements within and without than any other part of it and will always be as it was named twenty-five years ago by Mr. Olmsted, the true and permanent "Midway Plaisance," for the free enjoyment of the people who own it. The only structures of a permanent nature that have been erected on it during the Fair are the buildings of the German Village. Some of these are worthy to be retained as examples of old German architecture.

When on January 1, 1894, the World's Columbian Exposition will no longer be able to exclude the public from the main park, and the fence shall have been taken down the people will still find very much there. By the terms of the contract the north eighty acres, comprising all of the former improved part with its woods and lawns, must be cleared of buildings and the grounds restored to their original condition by May 1, 1894. Many buildings will still be standing by January 1, and some will probably remain until close to May 1, if the winter should be severe. The surface of the ground on this part has been very little changed from the old plan, and most of the roads are the same that they were before. The principal change has been the opening of a straight avenue to the lake on the prolongation of 57th Street, sometimes called the mall, which is not in harmony with the serpentine arrangement of the roads generally. But it has been planted with very good shade trees which have had two years' growth, and forms a short cut to the lake shore, which is one of the park's greatest attractions. If any part of the Fine Arts Building is preserved this road will have to remain.

With regard to the disposition or future use of the buildings on these eighty acres, nothing has been decided between the parties in interest up to the present time, except that a few of the State Buildings have been sold for removal. As the Exposition is held responsible for having all removed before May 1, it cannot be said to have any interest in having any of them remain. The only interested parties are the people who own the park and the Commissioners who are their trustees. What is there then that may be worth retaining as park improvements for the use of the people? It does not matter now by what means or on what conditions they may be retained; that is a business matter to be decided by the people's trustees. But if there is anything of a permanent character of artistic value, appropriate to a public park and properly located to harmonize with the design of the park, in this or any part of the grounds, it ought to be retained, if possible. If not retained it must necessarily be destroyed, and its value almost if not totally sacrificed.

The largest number of the buildings are frame covered with staff and plaster; and it is safe to assume that not being of a permanent character they must go. Of this class are the New York State Building and the California State Building, which are architecturally and structurally the best in the northern section. The former has been offered as a gift to a commission of women to aid in preserving the record of woman's work at the exhibition — a very worthy object. But no consent of the Park Commissioners has been asked or given for its remaining where it is. Before this is done it will be well to consider how it will look if isolated from surrounding structures. It does not range with the centre of the Art Palace or group with it in any way. It is too high for a park building and would look much higher than it now does when the surrounding buildings are removed. It could never assimilate with the park scenery under any circumstances and only looks well as part of a long street frontage.

The California Building has been offered to the Columbian Museum for its anthropological and ethnological collections. It would be less injurious to the rest of the park should it remain for a time, if all other buildings were removed. Running along the west boundary 435 feet, it is very much as if outside of its limits, for it terminates and forms a background to the landscape on that side. It is itself part of an historical and archæological exhibit, being a correct illustration of early Hispano-American architecture. For practical purposes its main entrance would be from Stony Island Avenue after the fence is removed. It would stand as long as its underground work is free from decay, and as the first coat of plaster on it is cement, it can easily be kept in repair.

There are some buildings which are apparently of permanent materials, but are really veneered on a wooden frame. Such are those of Wisconsin, Pennsylvania, Maine and New Hampshire. They are therefore to be classed with the rest and cannot remain as permanent buildings.

There remain the buildings of Idaho, Ceylon, Norway, Germany and England. All of these are constructed of permanent materials and are as substantial in their character as buildings of their class erected anywhere for permanence. If it is supposed that all others have been removed from the north end these will be found to be located just where they might be placed as park adornments. All are harmonious in color with the natural landscape and all are architectural exhibits that would pass critical judgment. That of Idaho may be too elaborate for a frontier cabin, but it shows how architectural effect can be obtained from crude materials, artistically used. It is also located in a naturally wooded part of the park. The Ceylon Building both in workmanship and design is such as we may never have an opportunity to see again and should be part of a Museum of Architecture. It is not only an exquisite example of the decorative work of old Ceylon by native workmen but a complete forestry exhibit from that island. It is little known that satin-wood is the principal material for the outer weathering and that teak and ebony enter into its construction. The building is low and is well covered by trees on the west side, while its east side gives diversity to the water frontage. The interior is without parallel for richness and elaboration.

The building of Norway is one of the most interesting wooden structures on the ground. The workmanship and woods are all from that country and it is not only a complete illustration of the old wooden architecture of Scandinavia, but a fair specimen of workmanship and design. It is one of those objects that are generally passed without notice except by those who are especially interested in them as it is almost concealed from points of view by trees.

The German Building has been described in this journal and it is too well known to require detailed comment. It is, in brief, an epitome of German Architecture of the fifteenth and sixteenth centuries by one of its greatest modern masters, and was designed and built for the place it occupies. If not presented to the people of Chicago by the German Government it ought to be purchased for what is fair to give for it under the circumstances. It is due to the part taken in the settling and development of Chicago by its citizens of German birth that this building should remain as long as it will stand as a reminder to them of the good old days of their Fatherland. It could be devoted to the purposes of a restaurant, which has always been greatly needed in Jackson Park. The chapel part, which was erected for the display of church furnishings would be an appropriate place to hold such souvenirs as are appropriate to express the friendly relations existing between Germany and the United States, under the care of the Columbian Museum.

The British Building stands in the same category as that of Germany and might be used for a similar purpose. These two are both appropriate souvenirs of the exhibition, and may be monuments of our fraternal relations with those countries. It is unfortunate that France did not also erect a permanent structure. That which it has built would be too near to Ceylon to form a park improvement,

even if it were substantially built. It is only from the beach that it seems to assimilate with the landscape. From this point only the beauty of its willow court can be seen. Its unsubstantial construction is of course an insuperable objection to its being saved.

There remains to consider only the Fine Arts Palace, which is the only exhibition building in the improved part. As under the contract it must be removed before May next its fate will soon have to be decided. There are strong æsthetic reasons why it should not remain as a whole. Its great length is such that it almost cuts the park in two and destroys some of its best vistas. Should the Columbian Museum secure control of it the whole building would doubtless be needed; but this would be at too great a sacrifice of the people's park. The main building is a complete design without the wings and its appearance would be improved by their removal. Considered as a work of art the remaining part would be the main exhibit of an architectural museum and in its details, carefully studied from the best remains of Greek architecture, it would be a reference-book for all architectural students. One white building would not do violence but, by contrast with its surroundings, would heighten the effect of the landscape. This building is seen at its best from the south side where, supplemented by architectural terraces, it rises from the water of the North Pond. If retained a certain expense would be entailed in preserving its exterior from decay. But the result would well warrant the cost, which would not be great for many years to come. In course of time the exterior could be renewed gradually in more permanent materials attached to the brick walls.

The Columbian Museum, if located in Jackson Park at all, can only be placed in the north end where it is immediately accessible to the people by reason of the nearness of public conveyances. For the south end will soon be deprived of all transportation facilities, and for a year to come will only be a scene of destruction.

Should the Commissioners have no use for such buildings as those of Ceylon, Germany and Great Britain they could all form part of the Museum, as there will be collections for which they would be more appropriate than the Art Palace. With these and the California Building — the shelter-house on the lake shore, that was designed by Mr. Root being restored to its original use — the park can revert to the people with the opening of the buds in May, rejuvenated and adorned as it never was before. In such condition it will be the best memorial of the Great Exhibition.

At the south end the destruction will go on until there remains a much larger area only improved by engineering works. The lagoon and the Wooded Island will be the only addition to the present landscape improvements. If the Park Commissioners desire the Horticultural Building or any part of it they can have it. No others in this section are of such a permanent nature that any one could wish to retain them.

The Convent of La Rabida might be retained as an historical and archæological curiosity. The Administration Building will probably stand until the others are removed so that it can be seen from all points of view. The architectural revetments of the Grand Basin and Canal will soon fall into decay and will not be worth keeping in repair. The iron bridges built on wooden piles may be stripped of their plaster mask and kept for useful purposes until they can be permanently decorated. The Statue of the Republic is well covered with gold leaf and will endure the elements for many years to come.

There only remain two monumental structures which with propriety can stand for a time as memorials of the Exposition. These are the Columbus Arch at the entrance to the Grand Basin and the Obelisk supported by lions at the south end of the Canal. Both of these monuments are worthy of being re-built in permanent stone and should stand as temporary models and be kept in repair until this can be done. Then the history that has been made can be recorded in uneffaceable letters on the four sides of the Obelisk, when the World's Columbian Exposition of 1893 will be only a memory and Jackson Park will be mainly known as its former abiding place.

P. B. WIGHT.

[To be continued.]

SOCIETIES

NINTH ANNUAL EXHIBITION OF THE ARCHITECTURAL LEAGUE OF NEW YORK.

THE Ninth Annual Exhibition of the Architectural League of New York, will be held at the American Fine Arts Society's Building, 215 West 57th Street, New York City; from Monday, December 18, 1893 to Tuesday, January 9, 1894, inclusive.

The Exhibition will include:— Architectural Designs embodied in Plans, Elevations and Sections and shown in Perspective; Finished Detailed Working-drawings; Designs for Decoration, Furniture and allied work; Cartoons for Stained-glass; Full-size Working-drawings for Ornament, Models of executed or proposed work; Completed work such as Carvings in Stone or Wood, Bronze, Wrought-iron, Mosaic, Glass, Textile Fabrics and Furniture; Sketches, Drawings and Paintings of Architectural or Decorative Subjects.

Photographs will be admitted only when they serve to elucidate an accepted exhibit.

It is especially requested, that all perspective drawings of architectural subjects shall be accompanied by plans drawn to a small scale.

Exhibits will be received at the Fine Arts Society's Building on and after Wednesday, December 6; none can be received after Tuesday, December 12.

The League will collect and return, free of charge to exhibitors, in New York City, Philadelphia and Boston, all exhibits that have been properly entered; all others must be delivered at the Fine Arts Society's Building, carriage prepaid and ready for exhibition.

The private views for exhibitors, the press and members of the Architectural League will be given on Friday, December 15, from 10 A. M., to 4 P. M.

Collections will be made as follows: — In New York City on Thursday, Friday and Saturday, December 7, 8 and 9, by W. S. Budworth & Son, No. 1 West 14th Street.

In Boston, on Wednesday and Thursday, December 6 and 7, by Williams & Everett, No. 190 Boylston Street.

In Philadelphia, on Wednesday and Thursday, December 6 and 7, by Isaiah Price, No. 10 South 18th Street.

No work will be sent for unless the entry for it has been received by the Secretary, Mr. Charles I. Berg, No. 10 West 23d Street.

All exhibits must be properly labelled.

Drawings must be either framed or mounted.

Exhibits of non-resident members are to be sent to a consignee in New York, who will deliver them at the Fine Arts Society's Buildings, and return them to the exhibitor at the close of the Exhibition.

The names of such consignees are: — William S. Budworth & Son, No. 1 West 14th Street; Thomas A. Wilmurt, 54 East 13th Street; J. Harrison Mills, 147 East 23d Street.

The Committee on Exhibitions will be the jury for the selection and arrangement of all exhibits.

For the Committee on Exhibitions,

WILLIAM B. TUTHILL,
Chairman Sub-Committee on Architecture.

COMMITTEE ON EXHIBITIONS.

GEORGE B. POST, *Chairman Ex-Officio.*
WARREN R. BRIGGS, *Ex-Officio.*
FRANK A. WRIGHT, *Ex-Officio.*

GEORGE KEISTER,
BRUCE PRICE,
WILLIAM B. TUTHILL, *Chairman,* } *Sub-Committee on Architecture.*

D. C. FRENCH,
WILL H. LOW,
F. S. LAMB, *Chairman.* } *Sub-Committee on Decoration.*

SEVENTH ANNUAL COMPETITION FOR THE GOLD AND SILVER MEDALS OF THE ARCHITECTURAL LEAGUE, IN CONNECTION WITH NINTH ANNUAL EXHIBITION OF THE ARCHITECTURAL LEAGUE OF NEW YORK.

Conditions. — 1. The competitors must be residents of the United States, and under the age of twenty-five.

2. The drawings shall be made in conformity with the following programme, and entirely by the hands of the competitor.

The awards will be made under the direction of the Committee on Competition and Awards.

The successful drawings, and such others as may be thought worthy, will be hung at the Exhibition, the first and second prize drawings being so indicated, and these latter shall become the property of the League.

PROGRAMME.

"A Village Church in the Colonial Style."

The church is supposed to stand some distance back from a village street, with terrace approaches. A belfry is to be a feature of the design.

The interior of the church is to have a gallery across the front wall with vestibules beneath.

Only the front of the church with the necessary entrance and vestibule is to be shown. In a general way the materials of construction are to be noted on the elevation.

The drawings will be placed on two sheets, each 24″ x 36″, one sheet containing a section and elevation to scale of one-eighth inch to foot, and a plan to scale of one-sixteenth inch to foot; the other sheet a perspective view.

Each sheet must be distinguished by a motto or cipher. A sealed envelope bearing the same motto or cipher must contain the name, full address, place and date of birth of the author, and must be mailed to the Committee on Competition and Awards of the Architectural League, No. 215 West 57th Street, New York, on or before December 5, 1893.

Drawings are to be delivered flat, carriage paid, at the same place. They will be returned at the close of the Exhibition at the expense of the contributor.

GEORGE L. HEINS, *Chairman,*
EHRICK K. ROSSITER,
EDWARD H. KENDALL,
JOHN DU FAIS,
FRANCIS C. JONES, } *The Committee on Competitions and Awards.*

ILLUSTRATIONS

[*Contributors of drawings are requested to send also plans and a full and adequate description of the buildings, including a statement of cost.*]

DINING-ROOM OF THE UNIVERSITY CLUB, SAN FRANCISCO, CAL. MR. A. PAGE BROWN, ARCHITECT, SAN FRANCISCO, CAL.

[Heliochrome, issued with the International and Imperial Editions only.]

THE PERISTYLE AND COLUMBUS ARCH, JACKSON PARK, CHICAGO, ILL. MR. CHARLES B. ATWOOD, ARCHITECT.

APARTMENT-HOUSE FOR MESSRS. MCGREENERY BROS., BOSTON, MASS. MR. PATRICK A. TRACY, ARCHITECT, BOSTON, MASS.

CUPOLA ON THE OLD SOUTH STREET MARKET, PHILADELPHIA, PA.

TANK AND GREENHOUSE FOR B. S. BARNES, ESQ., ST. LOUIS, MO. MR. A. BLAIR RIDINGTON, ARCHITECT, ST. LOUIS, MO.

TWO PAVILIONS IN FOREST PARK, ST. LOUIS, MO. MESSRS. EAMES & YOUNG, ARCHITECTS, ST. LOUIS, MO.

[Additional Illustrations in the International Edition.]

HOTEL DE LA PREFECTURE, LYONS, FRANCE

THIS important structure lies between the Cour de la Liberté and the Rues Pierre Corneille, Bonnell and Servient, occupying a total area of about 22,000 square metres for the site, while the building itself, including the interior court-yards, measures about 6,000 square metres. The building was begun under the direction of M. Antonin Louvier, the late architect-in-chief of the Department of the Rhone, and corresponding member of the Institute. At his death, which took place in June, 1892, M. Louis Rognat, his assistant and son-in-law, succeeded to the charge of the work.

This plate is copied from *La Semaine des Constructeurs.*

THE CHÂTEAU DE MARTINVILLE, EPREVILLE, FRANCE.

ANOTHER view of this château, which is here copied from *L'Art*, was published in the *American Architect* for May 14, 1892.

THE KAUFHAUS, FREIBURG IN BREISGAU.

THIS plate, copied from *Zeitschrift für Bauwesen*, represents a building used for a market on the lower floor while the upper story contained a hall devoted to municipal festal occasions. It dates in part from 1432. The exterior is decorated in color and low relief memorial escutcheons, etc. The four statues, also colored, represent the Emperor Maximilian I, his son Philip I, of Spain and his grandson the Emperor Charles V and Ferdinand I.

TWO INTERIORS OF A TYROLESE CASTLE. HERREN ZAAR & VAHL, ARCHITECTS.

THIS plate is copied from *Architektonische Rundschau.*

PULPIT IN HOLY TRINITY, CHELSEA, ENG. J. D. SEDDING, ARCHITECT.

THIS plate is copied from the *British Architect.*

THE HOSPITAL OF ST. ELIZABETH, AMSTERDAM, HOLLAND.

THIS hospital, intended for incurables, is divided into four classes, corresponding to four categories of patients, varying between those who can contribute a considerable sum toward their own support and those unfortunates who are admitted without charge. The institution is under the charge of the regents of the Catholic orphan asylum for young girls, called Maison des Vierges. It is to contain 450 beds eventually, although only one-third of this number are at present placed at the disposal of the sick, but a sisterhood of thirty-two nuns is already in charge. The building contains only a basement, a ground floor and first story, and the whole central portion is devoted to the general service of administration, kitchen, chapel and the common rooms. The first two classes of sick are lodged in the buildings at the right; those upon the left are reserved for patients of the fourth class, while in the first story over the entrance are placed those belonging to the third class. In the basement, which is of considerable importance, are the cellars, the store-rooms, the arrangements for disinfection and the steam-heating apparatus. On the ground floor, which is raised about four feet above the sidewalk, is (at *O*) a ward for twenty patients, with bath-room (*P*), between the water-closets and the nurse's room, and at (*N*) is the consulting-room of the regents, while the other rooms are those for waiting and for the various administration services; while in other portions of the building are the refectories, the laundries, store-rooms of various kinds, the dwellings of the sisters, with cloister, chapel, mortuary, etc. The first story is particularly devoted to dormitories and private chambers. Two large courts and a central garden isolate the buildings, and give them abundance of air and light.

One of the merits of this group of buildings is that it is executed in the Dutch Renaissance style of the 17th century, and the severe character of the façade is slightly enlivened by alternation of white stones in the midst of masses of red brick. One arrangement should be noted, although not uncommon in many countries of the north, and especially in buildings of this nature. The outer windows are double, and the exterior walls between their outer and inner courses enclose an air-space, which enables them to resist extreme cold as well as too great humidity. The construction of the floors is in great part on masonry arches between iron beams, while the wards are floored with wood, though the corridors, kitchen and dependencies are flagged. American white pine, which can be had so cheaply in Holland, has been employed for all the fixed and movable furniture, while the roof is covered with Dutch tiles. Nearly 600,000 florins, or $260,000 have been spent up to the present time in the erection of the greater portion of the building, which, with the pavilions to be erected hereafter, will call for a total outlay of about $400,000. This plate is copied from *La Construction Moderne.*

AN ANCIENT HARBOR IMAGINED AND DRAWN BY MR. H. W. BREWER.

AT the present time there does not exist, as far as I am aware, any mediæval harbor which retains all its ancient characteristics. It is true that at Lubeck, La Rochelle, St. Malo, etc., portions, or indications of the ancient arrangement may be traced; but, owing to the greatly increased size and importance of vessels of every description, the necessities of modern commerce have swept away most of the erections which rendered the mediæval ports so highly picturesque.

From ancient drawings and pictures, however, those in the "*Nuremberg Chronicle*," for instance, Aitzinger's "De Leone Belgico," Somern and Ravesetein's "Brabantia," we are enabled to restore on paper some of the picturesque arrangements of an ancient harbor.

One of the most striking features must have been the single or double archway upon which the ramparts of the town were carried across the mouth of the harbor. As a rule there would appear to have been two arches with a projecting turret between them; its outer face and that of the ramparts themselves were defended by battlements and loopholes, but the inner face presented the appearance of an open gallery of timber, covered with a slate or tile roof. The object of this treatment is obvious. If by any chance this important defensive work fell into the hands of the enemy, it was impossible for him to use it against citizens of the harbor itself.

In close proximity to this fortified entrance, and generally within it, were the water-gate and the great lifting-crane. Good examples of the former structure exist in some of our English towns, notably Norwich and Sandwich, and at Andernach on the Rhine is a fine example of a mediæval crane mounted upon its round tower. A very striking and picturesque one was destroyed a few years ago at Bamberg, which was of post-and-pan work.

The great warehouses and bonding warehouses which surrounded the harbor were themselves fortified, loop-holed and machicolated. The great tower of the principal church generally overlooked the harbor, and was, as a rule, so solidly constructed, that it was capable of serving as a kind of castle, or a place that could be defended as a last resource. Probably also these great lofty church towers, such as we see in Holland and Belgium and round the English coast, were used for purposes of signalling The people in the Middle Ages were eminently practical in their ideas, and knew well how to make their buildings serve two, and sometimes three, different purposes; the covered galleries which form such interesting features attached to the ramparts of old German towns are, where they still exist, now used as rope-walks, and I should think it is extremely probable that this was frequently their ancient use in times of peace. I should mention, in conclusion, that the drawing which accompanies this article does not represent any particular place, but is purely a composition.

This plate is copied from the *Builder.*

WILBY HALL, NORFOLK, ENG.

THIS historic house, the property of Sir Hugh Reeve Beevoı, Bart., is not many miles east of Thetford, and is somewhat nearer the post town of Attleborough, while the closest station is that of Eccles Road. It has for many years been let to the same family, and the present occupier is Mr. Samuel Colman, to whom we are indebted for a few notes concerning the building and its original owners. Wilby was visited during the last excursion of the London Architectural Association, and thus a tention has been drawn to this most picturesque and interesting old house, which, comparatively speaking, is one of the less-known halls of the county of Norfolk. Who the exact builder of the house was seems entirely open to question, but it is known that Colonel Robert Wilton lived there in the days of Charles I, and the hall probably belongs to the

reign of James I. Wilton's lifetime, 1599 to 1657, embraced stirring times. It is not recorded, however, whether he sided with the Cavaliers or the Roundheads, though it is inscribed on his tombstone in Wilby Church that he was a "faithful patriot and true lover of his country." He had three wives. Hannah, his first wife, died in 1635, aged 31; Susanna, his second wife, died in 1643, aged 34, and Bridget, his last wife, died in 1652, aged 32. On one of the attic windows of Wilby Hall is the name of "Elizabeth ——, 1649," the year of the execution of King Charles I, and on another quarry pane appears a Latin inscription scratched with a diamond on the glass, which seems to read: "Alas! how can I tune my lute to a broken heart?" The lettering is almost illegible. The arms given with the title scroll on the accompanying plate are those of Robert Wilton, associated with those of his three wives, as copied from his tombstone. Mr. Colman writes: "As to what date Wilby Hall was built, I have no information. I have heard Sir Hugh Beevor's grandfather (Sir Thomas B. Beevor) say it was built by the Wilton family." The Rev. C. R. Manning, Rector of Diss and Secretary of the Norfolk and Norwich Archæological Society, in a communication respecting the house, states that very little information is to be ascertained from printed sources, and no MS. records have yet been found relating to its history. It does not appear to be much older than the beginning of the seventeenth century. Wilby Manor is stated by Blomefield to have been in the possession of the Curson family in the fifteenth and sixteenth centuries, and in 1565 William Curson sold it to Sir Thomas Lovell, in whose family it remained till 1627, when Edward Hobart of Langley bought the property in trust. It then passed, as already stated, to the Wiltons, and was joined to the Manor of Beckhall. Doubts remain as to when the possession of the Wiltons commenced. Over the entrance doorway are the arms of the second and third wives of Robert Wilton, above referred to; but this enrichment appears to be of somewhat later date than the house itself, and, indeed, must have been so, as Susanna died in 1643. The work corresponds very closely in design with Barningham Hall, near Bickling, and Thelveton Hall, near Diss, the general design being thoroughly typical of East Anglian architecture. Sir Hugh Reeve Beevor says that the present chimneys were designed and erected when the slate roof was added by Sir T. B. Beevor in 1830. The main beam of the hall had to be braced up in 1885. The foundations are only about eighteen inches below the surface, but the structure is substantially built. The small addition to the left dates from the last century, and it is supposed that the porch originally formed the central feature in the composition of the entrance façade. The building is most charmingly located away from the road in a pretty garden surrounded by a wall, as indicated in the drawing. To the left of the Hall is a considerable group of farm buildings, and the residence is unrestored and well cared for. Our view is based upon a sketch recently taken on the spot, aided by a photograph produced for Sir Hugh Beevor, and lent us by Mr. Codman.

This plate is after a drawing by Mr. Maurice B. Adams published in *Building News.*

VICTORIA ASSIZE COURTS, BIRMINGHAM, ENG. MESSRS. ASTON WEBB & E. INGRESS BELL, ARCHITECTS.

ST. PETER'S CHURCH, STAINES, ENG. MR. GEO. H. FELLOWES PRYNNE, F. R. I. B. A.

THE above-named new church is the generous gift of Sir Edward Clarke, Q. C., late Solicitor-General. After some delay the tender for 6,000*l.* was accepted, this sum being exclusive of tower and spire. The style chosen in design is a free treatment of Perpendicular in red brick and stone. The plan shows a nave of four bays 26 feet wide by 80 feet in length, having a height of 40 feet to the apex of the wagon roof. The chancel, which is 38 feet 6 inches in length, is of the same width and height as the nave. Aisles 10 feet 6 inches wide are thrown out on north and south side of nave. A narthex is placed at the west end with western entrance. The tower, which is placed at the southwest end of south aisle, is designed in three stages, and capped with a copper-covered spire. In the lower stage on the nave-floor level a baptistery is formed. In the upper stages, which are ornamented externally with panelled work in brick and stone, are arranged the belfry and bell-ringers' floor respectively. A southern transept with separate entrance forms the nave of a small chapel on the south side of chancel. Clergy and choir-vestries and organ-chamber are placed on the north side of chancel, and passages are left on the north and south of chancel. The altar is elevated by steps from the nave-floor level, and ample space and height are left above and behind the altar for a baldachin or reredos. One of the main features of the church is the constructional rood-screen, which is carried right up into the chancel arch, the upper portion enriched with tracery. The central figure and cross are designed to be cut out of the solid stonework of the tracery, and the side figures placed on corbels formed in the panels of the tracery. The site of the church, facing as it does directly upon the River Thames, is most picturesque, but owing to the prevalence of floods the nave floor has been kept higher than the level of any known flood.

The illustration of the interior is from a drawing which was exhibited i the Royal Academy this year.

PRAGUE. AFTER A DRAWING BY SAMUEL PROUT.

OFFICIAL PRAISE OF THE WORLD'S FAIR BUILDINGS.

THE great, one might almost say the absolute, meritoriousness of the work accomplished by American architects in the architectural treatment of the World's Fair buildings, and the cordiality and unanimity with which foreign and native critics of rank have expressed themselves on this head — certain reservations of course being understood — have deprived official speeches and utterances of various kinds of that purely perfunctory character which under ordinary circumstances one would naturally assume to be the true one.

We believe that praise has never been more honestly won by artists or more cheerfully and truthfully accorded to them than in the case of the artists of the World's Fair, and, coming from the quarter it does, few words of praise can have given more satisfaction than those which Herr Kyllmann, member of the International Jury on Architecture, has recently addressed to Mr. Burnham.

MR. BURNHAM: —

My international colleagues, members of the Board which has been appointed to pass judgment upon the merits of the architectural works exhibited at the World's Columbian Exposition, have honored me by offering me the chair of their worthy body — the greatest honor, perhaps, that has ever been allotted me during my entire lifetime. For it is my firm belief that there is hardly a branch of this Jury of Awards, the importance of which is equal to that of the Department which has had the distinction of being entrusted with examining the products which to the World's Columbian Exposition of 1893 have given its peculiar stamp, whereby it is distinguished from all former World's Expositions — I refer to its grand, noble, magnificent, majestic architecture, so characteristic and typical of American art at the close of this present century. We European architects came here with high expectations, expectations which, nevertheless, are vastly surpassed and outdone by what has presented itself here before our very eyes. Neither the days of antiquity, nor modern times have witnessed a work of such architectural grandeur. The mighty rulers of Assyria or Egypt, the emperors of Byzantium or Rome, Charlemagne or Emperor Napoleon have in vain endeavored to enhance their fame by architectural monuments of such beauty, boldness and dimensions, grouped in the most wonderful combinations, as those that are here to-day liberally offered to the American people and its hosts of guests. Permit me, dear Mr. Burnham, to tender you, as well as your colleagues, to whose genius, admirable endurance and enviable coöperation we are indebted for this triumph of architecture, our most sincere and collegial congratulations. Aside from the medals we have adjudicated to the various buildings and their talented authors hailing from all the civilized countries of the world, we beg to be permitted to confer the same distinction upon the artist who has been at the head of the entire work at Jackson Park, and to whom is due such an eminent share in the success of the glorious enterprise.

(Signed) W. KYLLMANN, Kgl. Baurath, Berlin.

COMMUNICATIONS

[*The editors cannot pay attention to demands of correspondents who forget to give their names and addresses as guaranty of good faith; nor do they hold themselves responsible for opinions expressed by their correspondents.*]

A DISPUTE WITH A CHURCH BUILDING-COMMITTEE.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — I have been forced to consult you in order that I might know the proper course to pursue under the following circumstances, and sincerely trust that I shall receive your valuable opinion thereon at the earliest possible moment.

Several months ago I was consulted by a building-committee, appointed from the board of directors of a certain church congregation in Philadelphia. Their idea at that time was to erect upon their lately purchased lot a chapel, to be used at the same time for Sunday-school purposes, at a cost not exceeding twelve thousand ($12,000) dollars.

At a second meeting of the board at which time this matter was discussed, the president presented the suggestions of another architect. As this was the first intimation I had that there was any indication of a competition, I inquired of the chairman of the building-committee what I might understand by this, and was assured that, although it was the desire of the president to have a friend of his employed for this work, yet it was by the unanimous desire of the building-committee that I had been selected as their architect (although no formal contract was signed), and they assured the board in my presence that, although the suggestions that I had up to that time presented did not entirely fulfil their requirements or ideas, yet they felt satisfied that they could get by a sufficient study what was needed.

I should here state that instead of erecting a chapel on the rear of the lot with the intention of building their church proper in front at some future period, as is frequently done in city work, some suggested,

myself among the number, the advisability of building this same edifice possibly more decorative externally, but on the front of their lot, and upon these suggestions we began our working-drawings.

After several meetings of the board for the purpose of discussing these drawings in detail, it became apparent to all concerned that it was almost impossible to erect a building in this position, that would adapt itself successfully to a chapel and a Sunday-school at the same time, so that it was fortunately decided to abandon any consideration of the portion to be built as adaptable to a Sunday-school, but to consider the possibility of building the front of the church proper, although they were aware it would cost much more money than they originally intended spending. We then took our drawings at this stage and remodelled them, at the same time designing at eighth-scale the floor-plan of the entire structure with front and side elevations.

After considerable estimating, which determined the necessity of some changes in materials to be used, thereby reducing the cost, our drawings were formally approved and a contract authorized with a firm (one of whom happened to be a member of the Board of Trustees, and up to that time a member of the building-committee) for a portion of this building upon which we had received estimates; the contract price being twenty-one thousand and sixty-one ($21,061) dollars. The contract stating that all work was to be erected in accordance with our drawings and specifications and under our superintendence, and particularly that any changes, whether additions or deductions, were not to be made without the architect's regular order and his computation or approval of the amount of money involved.

After this contract was authorized, I was asked at a meeting of the board, by the president, (although the chairman of the building-committee knew before I was consulted), what my commission would be on the work under contract; it being their object at that time to compute the amount necessary to pay all additional charges in connection with the operation and the cost of memorial windows, furnishings, etc. At this same meeting the builder absolutely refused to execute the contract if I superintended the work and I advised a member of the building-committee to relieve me of this portion of my duties (having explained that the superintendence would represent 1½ per cent of the commission). After some discussion however, it was the unanimous desire of the board that I should superintend their work, the result of which has been a great amount of ill feeling and controversy.

The owners of their own accord have made many changes in the work; two of which (that is, the color of the brick and terra-cotta) seriously affect the building architecturally, and in many other ways have ignored my opinion and advice. At this stage they not only assured me I have no claim on them as to the ultimate completion of the entire structure, but cannot expect remuneration over and above the five per cent on the contract.

Of my own accord a perspective of the building has been made for the purpose of studying the composition, and was finally rendered in water-color for reproduction, at the same time I furnished them with plans showing not only the portion under contract at this time, but the entire structure as it will appear when completed, in order solely to aid them in securing subscriptions. Now, because of this apparent disregard of my advice, the fact that they have not only violated methods provided by their contract (which they seem disposed to continue) that the builder has not only charged that our drawings are so incomplete and incorrect that he must stop work, but has asked for numerous full-sized details without which the work cannot be properly constructed; (it has been made clear to the building-committee that these charges are false and I have refused to make these further drawings because the various sub-contractors have assured me that they have all they require) I have been forced to tender them my resignation as their architect; have been asked by the chairman of the building-committee to withdraw it, but because of the continued abuse have demanded its acceptance, but without avail and because of the assurance that I have no claim as their architect for the balance of this structure, have added on my bill to date a charge of one per cent on the approximate cost of the balance of the building. For some reason they do not care to accept my resignation, nor to pay any commissions beyond the five per cent on the contract.

The above is as concise and clear a statement of the case as I can possibly make and I trust you can advise me:

1. How I can force them to accept my resignation.
2. If they are liable for the one per cent on balance of building shown by my design.
3. If the builder is liable for his false statements and gross misrepresentations.

Very truly yours, TRANSEPT.

[To give a satisfactory answer to these questions would, we fear, require a knowledge of many points which could not be made clear in a letter, but we will try to state general principles, in the order in which the questions are asked.

1. We do not see how the committee can be forced to accept the resignation of the architect. The contract of employment involves two parties, and neither can retreat from this engagement without the consent of the other.

2. Whether the committee is liable for the value of the work done in designing the possible future building depends entirely upon whether this work was done in pursuance of the committee's request. If not, the committee is not liable.

3. If the architect has done his duty skilfully and conscientiously, and the builder has maliciously slandered him, so that the architect has thereby suffered loss of money, employment or reputation, damages to the value that a jury may set upon this loss can be recovered.

We hope that, having answered these questions, we may be excused for adding that, in our opinion, in such cases an architect would do well to spend a little time in trying to put himself, mentally, in the place of those persons whom he considers to have ill-treated him. This exercise would show him that he had no right whatever to complain of the changes in material, or even in design, made by the owners. However displeasing the result may be to him, the right of the owners to have the color of the building to suit themselves, whether it suits the architect or not, is absolute. In the same way, we think, a more just appreciation of a builder's position in such a matter might be reached. That a builder should absolutely refuse to execute a contract if a certain architect were to superintend the work indicates a prejudice on the builder's part too strong to be entirely assumed, and it would be only prudent for an architect to try to discover the grounds of this prejudice, and have them removed. In the present case the committee seems to have stood loyally by the architect, and with this support, and a little courage and good temper, the misunderstanding ought to have been readily explained. Probably it would not be too late for this even now.—EDS. AMERICAN ARCHITECT.]

ENGLISH *VS.* GERMAN PORTLAND CEMENT.

October 25, 1893.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—Do you happen to know "*Cements et Chaux Hydrauliques*" par E. Candlot, 1891?

In corroboration of what you say about English cement, Candlot says: "The manufacture of cement in England has remained about the same as twenty years ago . . . . These raw materials are of very good quality, and their regularity of composition explains how with their imperfect processes, the manufacturers of English cement can, however, deliver products which give satisfactory results." (Page 61.)

"An English engineer, M. Redgrave, said in 1880 in speaking of the superiority of German cement 'Stern' over the best English cement, 'This result is due simply to the care and exactitude taken in the mixing of the carbonate of lime and clay, and the extreme fineness of the cement. If it were useful to prove the lamentable carelessness which reigns in the manufacture of English cement,' etc., etc." (Page 62.)

In comparing English with German manufactures, Candlot adds: "The great and rapid development of the manufacture of Portland cement in Germany is not due as in England to the exceptionally favorable quality of the raw materials, for in many of the German works the raw material is very difficult to treat. But German manufacturers have made the greatest efforts to produce a material of good quality, and to introduce in their work skilful and economical processes. They have made such a profound study of the properties and uses of cement, that it has resulted in giving to the manufacturer precise rules and to the consumer a great confidence in a product of which he knows how to appreciate all the advantages. German manufacturers have formed an association open also to foreigners. They meet at stated intervals to discuss the questions which concern the manufacture, quality of cement, etc., etc. The experiments and researches made in one manufactory equally profits all the others." (Page 64.)

I should prefer to accept the authority of Candlot than that of the *Builder*, and if the matter should be followed up further you would have a strong support to fall back on.

Yours, F. W. CHANDLER.

THE SILVER STATUES AT THE WORLD'S FAIR.

PROVIDENCE, R. I., October 23, 1893.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—The *American Architect*, issue of 21st inst. is received this morning and we thank you for the complimentary notice of the Silver Columbus. The article, appearing as it does in comparison with the Ada Rehan Statue, the estimated value of which is so fearfully exaggerated, does us an injustice in that respect. For instance, you say the Rehan Statue weighs 1,631 pounds Troy, cost $61,800. You can readily see that 1,631 pounds Troy is equivalent to 19,572 ounces which could not have cost over 85 cents per ounce = $16,636.20.

Again you say the plinth is gold. You should have said "had the plinth been of pure gold it would have been of great value," but as it is gilded to represent gold, the actual value of the plinth is comparatively trifling. It is simply ridiculous to place the value of that statue at $307,675 and the Columbus at $40,000 or $50,000.

The replica of the Columbus Statue in bronze is not to be presented by Mr. Clark but by the citizens.

A statue of Ebenezer Knight Dexter is to be given by Mr. Clark. It is being modelled and the model has been accepted.

Yours truly, GORHAM MFG. CO.,
J. F. P. LAWTON, *Sec'y.*

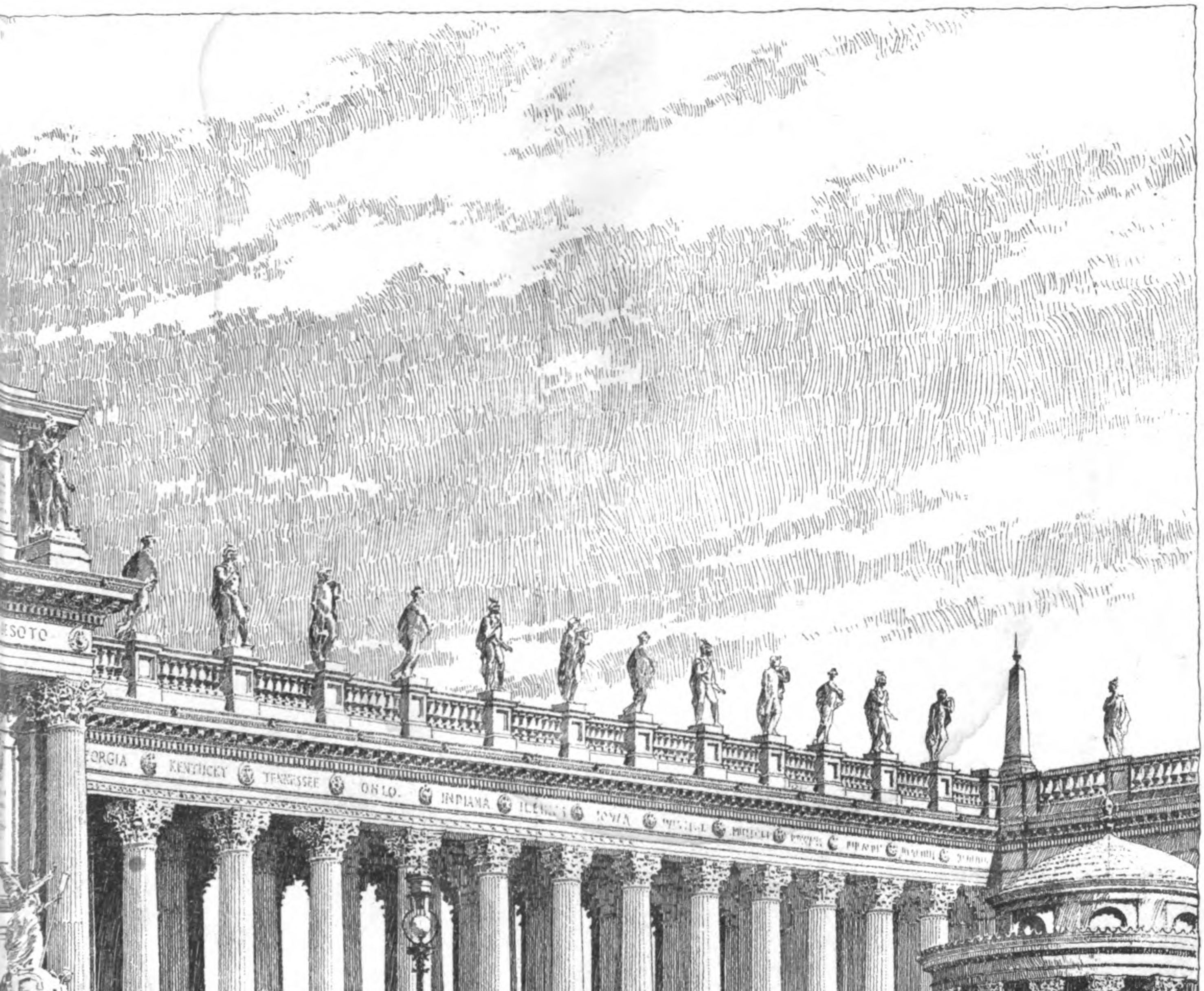
[WE took the statements as to the Montana silver figure from the Chicago *Graphic* without analyzing them, as ought to have been done. That authority, if it can be called such, said that the plinth was of solid gold, a statement which as it concerned the exhibit of a mining State seemed not unreasonable and in a degree accounted for the great alleged total cost.—EDS. AMERICAN ARCHITECT.]

S. J. PARKHILL & Co., Printers, Boston, U. S. A.

AMERICAN ARCHITECT AND

MEMORIAL ARCH OF PERISTY

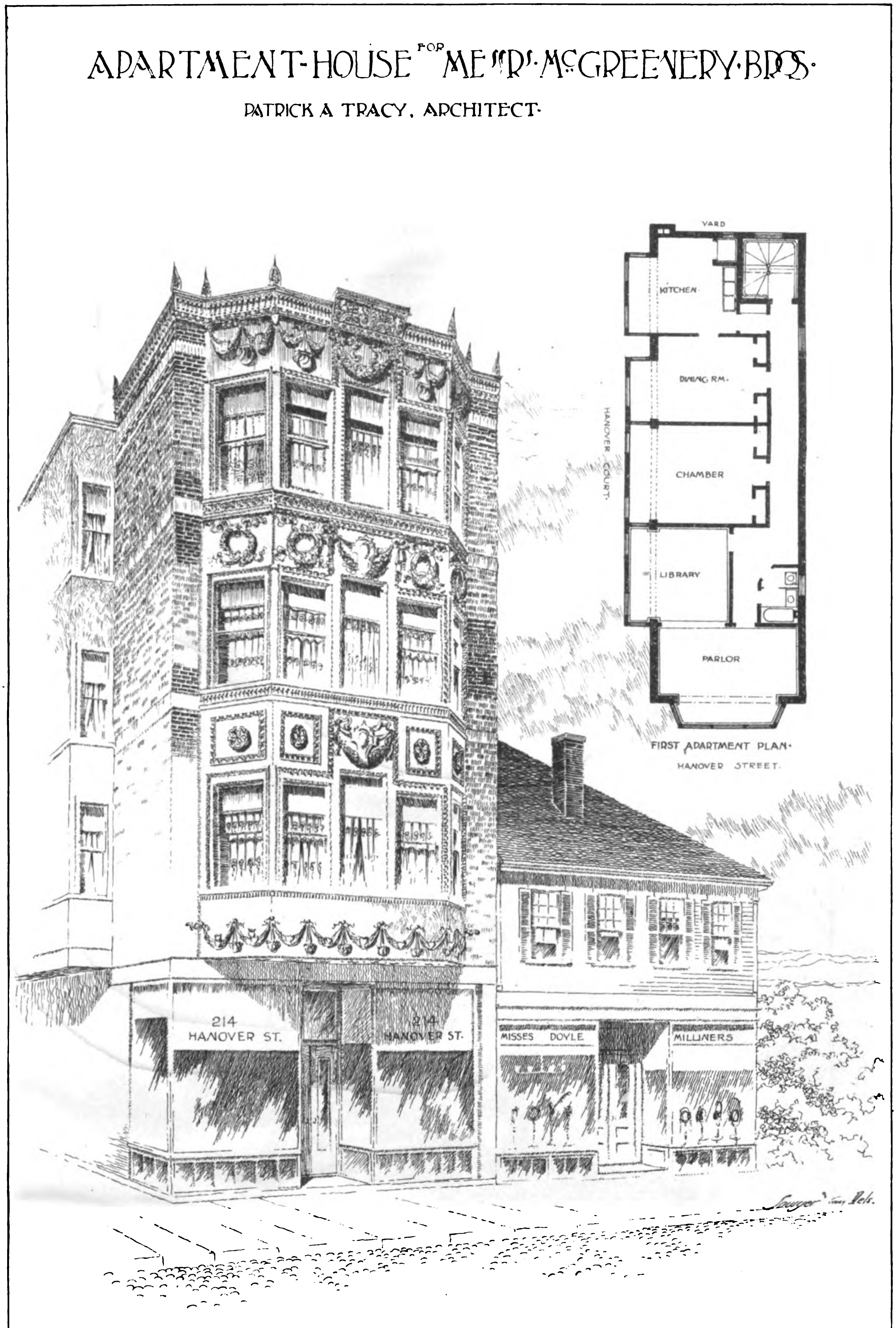
CHARLES B. A



HELIOTYPE PRINTING Co. BOSTON

YLE, COLUMBIAN EXPOSITION.

ATWOOD, ARCH'T.



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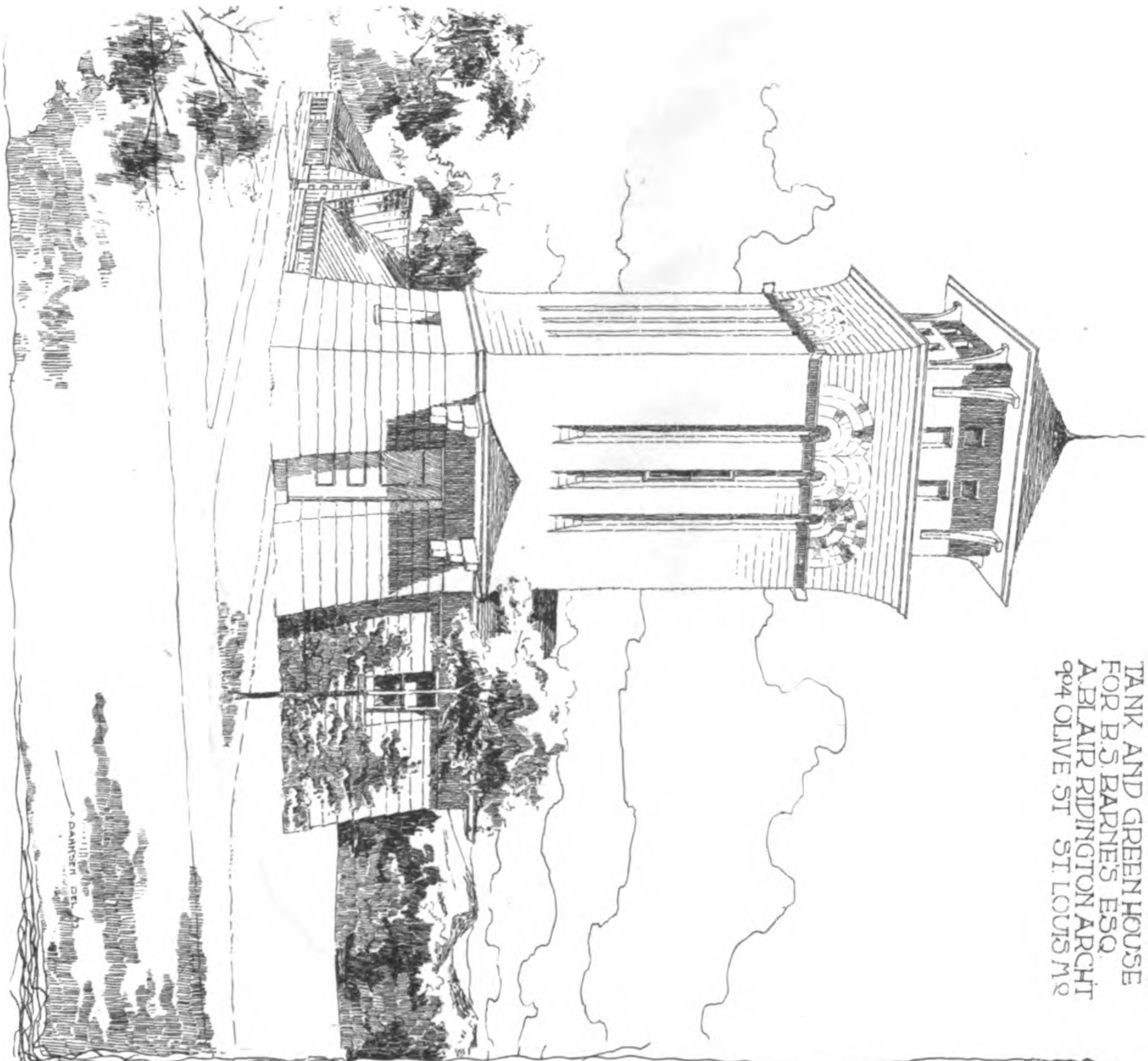
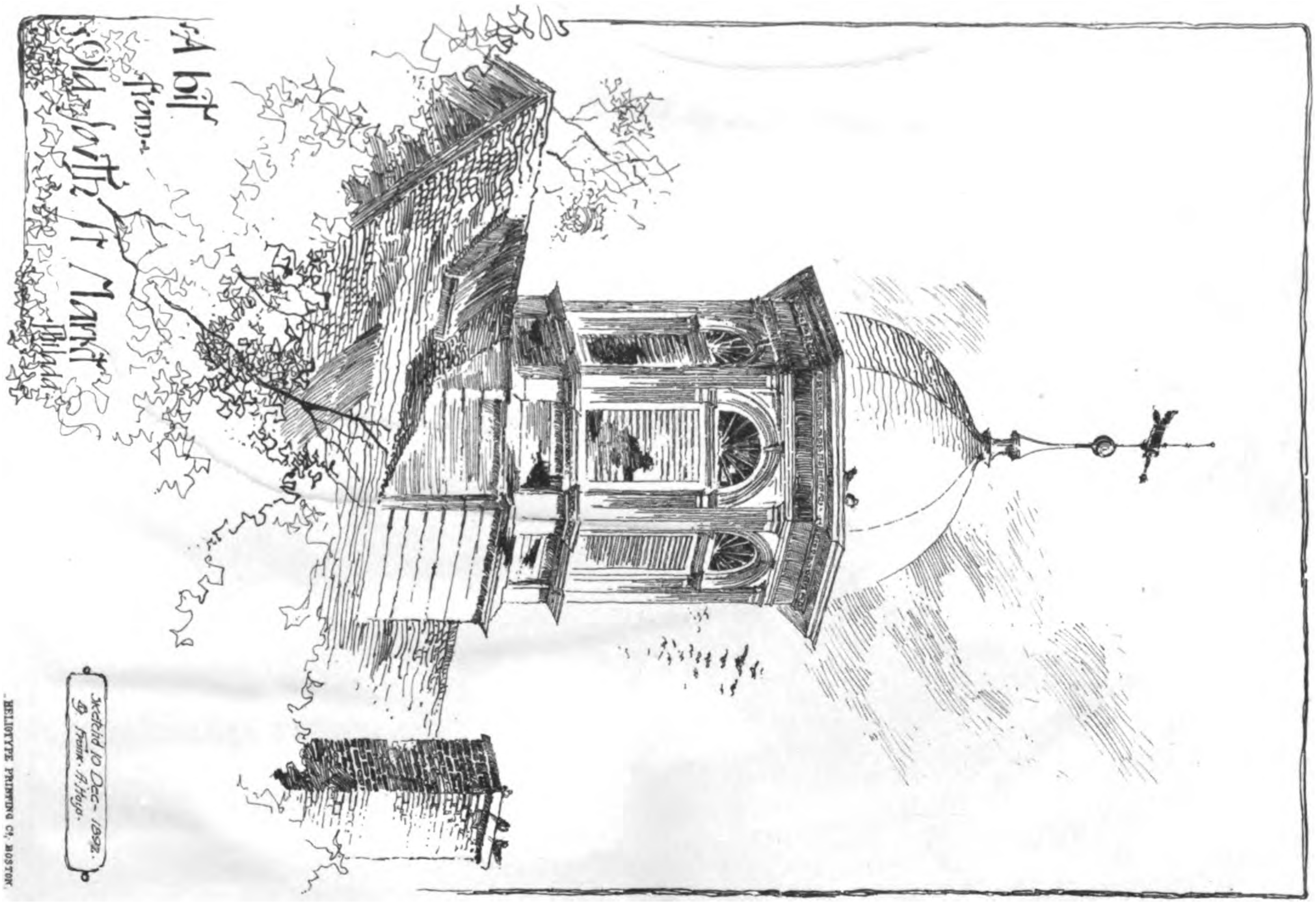
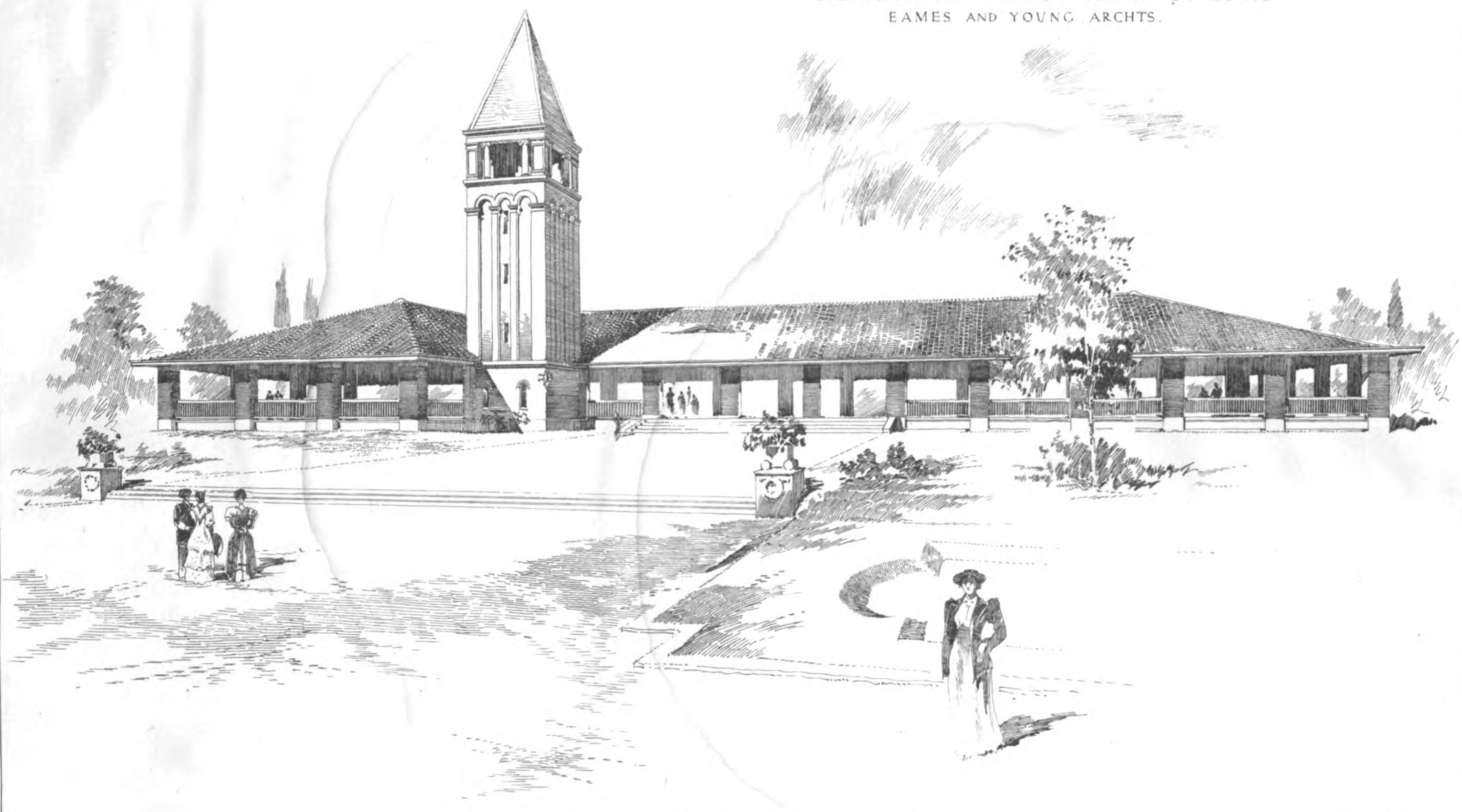


TANK AND GREEN HOUSE
FOR B. S. BARNES ESQ.
A. BLAIR RIDINGTON ARCH'T
904 OLIVE ST ST. LOUIS MO



PAVILION IN FOREST PARK, ST LOUIS.



PAVILION AT FOREST PARK ST LOVIS
EAMES AND YOUNG ARCHTS.

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NOVEMBER 4, 1893.

CONTENTS

THE Trustees and architects of the New York Cathedral are finding difficulty in getting suitable foundations for their building. After the laying of the corner-stone, preparations were made for beginning the masonry of the other portions of the structure, and excavations were begun for the stonework of the great piers which carry the central tower. Under one of these, however, it was discovered that the ground, which consists of a plateau of rock, varying, like the rest of the ridge which forms the back-bone of Manhattan Island, from a strong, well-stratified gneiss to granite of various qualities, presented a seam, or rather, an extensive pocket, of loose, spongy "rotten rock," too soft to bear with safety the immense weight to be placed upon the pier. To ascertain whether a more solid material could be reached at a greater depth, a pit was excavated, forty feet square and forty feet deep, but nothing better was found. It was next proposed to change the location of the church, so as to bring the piers on the solid part of the rock, but an ecclesiastical objection was found to this, in the fact that the corner-stone of the building had already been laid, with due ceremony, and no precedent existed, either for translating a corner-stone so consecrated to another place, or for deserting a corner-stone, and building the church to which it was supposed to be attached somewhere else. However, this objection might have yielded to practical considerations, had it not been for a suspicion that the deposit of decomposed and spongy stone might appear at other portions of the ground, so that the new site might be no better than the old one. The contractor for the foundations, Mr. Crimmins, having ascertained by boring that the "rotten rock" in the original pit extended to a depth of at least a hundred feet, so that it would be useless to try to improve matters by carrying the foundation deeper, the Trustees took the sensible course of instructing the architects to take borings with a diamond drill at various portions of the site, so that a reasonably correct notion could be obtained of the whole ground to be dealt with. These borings are now nearly complete, and the results will be of much interest to architects who have, or may have, heavy buildings to construct in the upper part of New York, as well as to the Cathedral Trustees.

MOST of our readers have probably been informed, by the manufacturers, if not by any one else, of the fact that the great Hamburg City-hall, one of the most important buildings in Germany, is to have its rooms warmed by means of radiators made in the United States, four carloads of which have already been contracted for. We suppose that this is the building designed by the late Sir George Gilbert Scott, who won the commission in an international competition. If so, the Hamburg City Council deserves credit for the common-sense, and freedom from foolish chauvinism displayed in the choice of the best things offered, irrespective of the nationality of their authors; and the manufacturers on this side of the water are also to be congratulated on having been able to offer goods worthy of selection at the hands of the highly-trained German experts. As to the American public in general, it may be said that the introduction, into a market so critical as that of North Germany, of an important class of iron manufactures is an event to be noted. American stoves, or more probably stoves imitated from American patterns, have long been popular in Germany, and if our manufacturers and engineers could establish in the colder parts of the Eastern continent the reputation, which, indeed justly belongs to them, of understanding the business of warming public and private buildings better than any one else in the world, they would have an almost illimitable field open to their enterprise.

THE life of a walking-delegate presents so many attractions for people who like better to work with their tongues than with their hands, that it is not surprising to find the profession becoming, in certain localities, somewhat crowded. New York, for example, where men can be starved, beaten and murdered, contractors ruined and owners defied, to promote "the interests of Labor," has long been the very Paradise of walking-delegates, and, although those already in possession have not failed to use their peculiar arts to keep out rivals, some of these have already obtained a foothold. The building trades, federated under the name of the Central Labor Union, have been more closely organized, and unscrupulously managed, than any others, yet, notwithstanding the opposition of this powerful body, a similar one, known as the Union of Building Constructors, which is said to comprehend the whole United States in its territory, has established itself in the city. The local body of this organization is governed by what is known as the "Little Board" of walking-delegates, to distinguish it from the old Board, which has no love for its young rival, and openly persecutes the members of the Building Constructors' Union, urging contractors to discharge them, and ordering strikes in buildings where they are employed, although they conform to all union rules.

A FEW days ago an encounter between the rival dignitaries occurred in a building on Fifth Avenue, which Messrs. L. Marcotte & Co., are decorating. They had employed some painters who, instead of belonging to the orthodox union, were members of the Brotherhood of Painters of the United States, which is affiliated to the Union of Building Constructors, instead of the Central Labor Union. Their devotion to union principles and practices was perfect, they were paid the union wages, and no fault could be found, even by the most punctilious representive of "organized labor," with their conduct, or that of their employers. They paid homage, and tribute, however, to the Little Board, and the old Board consequently resolved to take away their living. Two walking-delegates of the old Board visited Mr. Schuller, of the Marcotte firm, and demanded that he should either discharge his men, or compel them to join the old union. He declined to do either, saying that he was employing only union men, at union wages and on union hours, and did not care to interfere in quarrels between unions. The delegates then betook themselves to the building, where they loitered about, threatening and arguing with the men as they went in and out. These persuasions did not have the desired effect, and it was found one morning that three of the newly-decorated ceilings in the house had been daubed with paint. This, of course, was a blow at the employers, who, however, patiently had the work done over again: but when the delegates reappeared a day or two afterwards, and commenced again their arguments with the men, Mr. Schuller thought it was time to protect himself, and laid the matter before the judge of the Yorkville Police Court. The judge, with the prompt decision which the New York judiciary has invariably shown in such cases, issued

warrants for the arrest of the two delegates. When they were brought before the Court, Mr. Schuller, with great forbearance, said that he did not wish to have them prosecuted, but simply to have them cautioned not to interfere with his workmen, and the judge ordered their discharge, with the warning that if they were brought before him again, he would send them to Blackwell's Island.

THE Jurisprudence Committee of *La Semaine des Constructeurs* makes a concise, but clear answer to a question which is often asked by people who know little of architects or their work. In this case, the question is asked by a man who manages the property of his wife, including, among other things, a house in Paris, which she has recently inherited from her father. The inquirer says that the house is uninhabitable, and only fit to be pulled down. Two or three years ago, an architect submitted plans for rebuilding the house to his father-in-law, who did nothing about them, and, after the death of the latter, brought them again to the new proprietor, wishing to be commissioned to carry them out. The writer says that he was not satisfied with the plans, and said so, and the architect thereupon made new ones, which, without any authority, he submitted to the city inspector, requesting, in the name of the owner, a permit to build from them. These plans were rejected by the inspector, and the proprietor, displeased both with the architect and his manner of proceeding, engaged another architect, whose plans were immediately accepted by the city officials. The first architect then sent in a bill for his services, and the proprietor writes to know whether he is bound to pay it.

TO this question the Jurisprudence Committee replies that, if the first architect was not requested, either by the present or the late proprietor, to make any plans, but made them voluntarily, in the hope of being employed, he is entitled to no compensation for his useless services. If, however, either the present or the late proprietor engaged or requested him to make the plans, they must be paid for, and the fact that they were useless does not affect the right of their author to recover compensation for them, unless he was guilty of some fraud in relation to them. If he had falsely represented to the owner that he was a skilful architect, and had thus secured employment which he would not have obtained otherwise, he could not, perhaps, require payment for services which turned out to be unskilful and worthless; but if he made no such false representations, and the owner engaged him on his own responsibility, the latter took the risk of his services proving valuable. It might with propriety be added, however, that the liability of the owner to pay for services extends only to such services as have been requested or accepted, and that an architect who was engaged only to make sketches could not claim payment for making working-drawings without authority, and submitting them to the inspector, unless the owner chose to accept or adopt this service by some subsequent action.

THE *Schweizerische Bauzeitung* gives an abstract of the preliminary contract just concluded between the Jura-Simplon Railway Company and the firm of Brandt, Brandau & Co., of Hamburg, for the construction of the tunnel through the Simplon Mountain which has been so long in contemplation. The terms now agreed to by the executive committee of the railway company must be ratified by the general council of directors, and it is provided that unless this ratification is completed, and notice thereof delivered to the contracting firm, before April 15, 1895, the preliminary contract shall be void, and neither party shall be bound. The preliminary agreement, which, when ratified, will form the decisive one, contemplates the construction of two parallel tunnels, about fifty-five feet apart, but the present contract includes only the completion of one tunnel, and the piercing of the pioneer gallery for the other. The total length of the main tunnel is to be 19,730 metres, or about twelve and one-quarter miles. The specifications require that four galleries shall be simultaneously carried on. One of these is the pioneer of the future second tunnel. The other three are within the section of the main tunnel, two forming the base, and the third the upper part, and, when completed, are to be joined by cutting out the rock between them, and finished with proper linings. Besides this work, numerous cross-galleries are to connect the two principal tunnels, and there are to be spaces for turnouts, niches for refuge, and rooms of a considerable size at various points, for the accommodation of the tunnel service. The contract price is 69,500,000 francs, or nearly fourteen million dollars, and the time allowed for completing the work is what the *Schweizerische Bauzeitung* calls the "unheard-of short period" of five and one-half years from the time of the ratification of the contract. A forfeiture of five thousand francs per day is fixed for each day's delay beyond the contract time of completion, and if the completion is delayed one year beyond the agreed time, the railway company may declare the contract void; but if the work is finished before the time assigned, the company agrees to pay the contractors a premium of five thousand francs for every day so saved. The contractors agree to assume the risk of all contingencies, excepting only earthquakes, epidemics, war and strikes not due to their fault. Within eight days after the ratification of the agreement, the contractors must deposit, as caution-money, one million francs, and seven and one-half per cent of each payment is to be retained until this caution-money amounts to five million francs. Three million francs of this will, however, be returned on the completion of the first tunnel, and a million and a half more on the completion of the second one, leaving five hundred thousand francs in the hands of the railway company, which is to be retained for two years, as security for defects not immediately apparent. The details of the construction are not published, but it is understood that an hydraulic boring-machine, invented by Herr Brandt, will be employed.

THE committee of the Boston Board of Aldermen on a new city-hall has reported, strongly favoring the erection of a new building on the ground bounded by Mt. Vernon, Beacon and Somerset Streets. On this site, the new building would occupy most of the space between the State-house and the new Court-house, which is now occupied by a mass of boarding-houses, and the change, by bringing the three largest buildings in the city in a group, would undoubtedly add much to the appearance of all. The committee, however, without mentioning this point, brings forward a practical consideration of much importance, showing that it will soon be necessary to provide better communication across Beacon Hill than is afforded by the present steep and narrow streets, and that the only practicable way of doing this will be to cut away the top of the hill, so as to get a proper grade for the new thoroughfares. As this is just the portion which will be occupied by the city-hall lot, the purchase of the territory now will save the heavy expense of cutting new streets through private property, and it will be easy, after the ground is cleared for the city-hall, to lower the grade as desired, and carry wide streets through between the new building and the State-house on one side, and the Court-house on the other, much to everybody's advantage. With such views on the part of the committee of the City Government, there seems to be really an encouraging prospect that, at last, an important public building in Boston may be placed where it can be seen. The two principal buildings in the city are, at present, the Court-house and the new part of the State-house, which have cost, together, something like ten million dollars. This is a large sum for a little State like Massachusetts to spend, and, in any other community, the taxpayers who furnished the money would wish to have the buildings so placed that visitors might see and admire the results of their sacrifice. This reprehensible vanity is, however, apparently unknown to the Bostonians. The State-house Extension is, indeed, visible from the northern suburbs, and glimpses of portions of it can be obtained, with great effort, from some of the neighboring streets; but the Court-house is the most thoroughly concealed public building within our knowledge. Every Bostonian knows the troops of distracted strangers who run up and down Winter Street on concert afternoons, trying to find the Music Hall, but the Music Hall is boldly conspicuous in comparison with the Court-house, which has the air of having been projected upward, like a trap dyke, in a secluded garden, and no portion of whose principal façade, except the front door, and portions of the cornice, can, we believe, be seen at a distance of more than a hundred feet. With such warnings before it, the City Government is hardly likely to repeat, for the third time, the mistakes of the State and County authorities, and it is to be hoped that the immense value of well-planned surroundings to an important building will, in this instance, be fully recognized.

TOWN-HALLS.[1] — I.

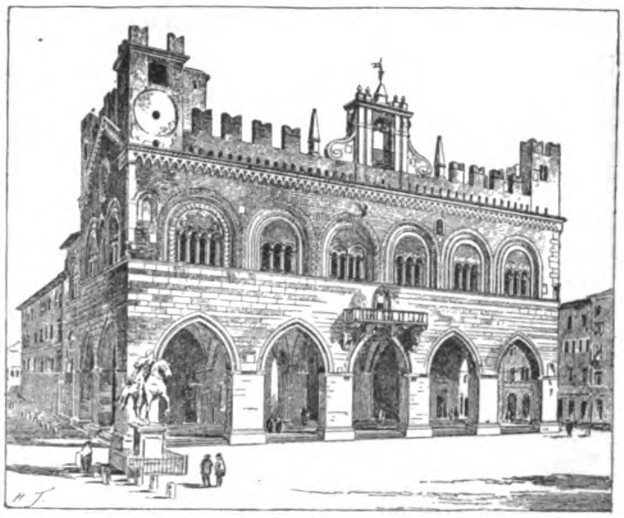


Fig. 1. Piacenza.

THE municipal edifices termed town-halls are not of very ancient origin. One would seek in vain for traces of such constructions in antiquity or in the early part of the Middle Ages. This is because the social organization that gave rise to them dates back but a few centuries.

After the overthrow of the old world by barbarian invasion, the conquered nations long remained in subjection. In France, for example, the Gallo-Roman race submitted in silence to Frankish rule until the moment arrived when, more sure of themselves, they could reclaim the enfranchisement of the communes. From that time a continual struggle went on between the nation, represented by the *bourgeoisie* cantoned in the towns, and the Frankish lords isolated in their fortified feudal castles.

Thenceforth, it became the ambition of the citizens to proclaim the recovery of their liberties by some outward, visible sign. Facing the seigneurial donjon should rise the belfry of the communal building. This town-hall should possess a threefold character. Standing in the centre of the commune, near the market, it could be used for commercial transactions; it would also furnish a place for the discussion of political matters by the burghers; it would serve as a fortress capable of repelling attack, while from its summit the town and its environs could be commanded.

Naturally, these claims were not at all relished by the lords. In many localities the inhabitants were forbidden to erect a belfry, or even a town-hall. In the regions north of the Loire, where were the principal seats of Germanic power, the freeing of the communes proved a long and difficult undertaking. Incessant warfare with the nobles retarded the free working of communal institutions, and consequently delayed

Fig. 2. Perugia.

the construction of town-halls. The first to be reared were destroyed and rebuilt several times. The burghers then had recourse to another combination to secure the opportunity to meet and discuss their interests among themselves. The clergy were likewise in a state of hostility to feudalism. In the cities the bishops many a time made common cause with the people; and the cathedral or church, which already offered the privilege of sanctuary, became also a gathering place for the citizens. A great many churches were erected with this double purpose in view and, for this reason, the expense was defrayed by the clergy and commune alike. It will thus be seen that town-halls antedating the Renaissance are necessarily rare north of the Loire.

Fig. 3. Pienza.

In central and southern France, the invasions from the North did not leave as deep traces. Here the Gallo-Roman race aroused sooner and demanded its liberties. Consequently, earlier indications of municipal organizations exist here. One of the oldest town-halls of which any vestige remains is that of Saint-Antonin (Tarn-et-Garonne). A view of this structure will be found in the article on "Civil and Domestic Architecture" (*American Architect* for January 25, 1890). We discern at the first glance outward evidences of the threefold character referred to above; the belfry rises over a sort of citadel within which there is a large assembly-hall. On the exterior are arcades that could be utilized for traffic.

Let us note, in passing, that the town-hall or communal building of the rural districts is of more recent date still. In fact, in the Middle Ages the country was not inhabited by the Gallo-Romans; the latter had taken refuge in the cities after the conquest. The few serfs needed for the cultivation of the soil were grouped in cabins at the foot of the feudal donjon. The village was unknown, at least the village organized into a commune. Until the Revolution, the clusters of dwellings built on the lands of the lord remained under the domination of the lord.

In Italy, the barbarians were rapidly absorbed into the

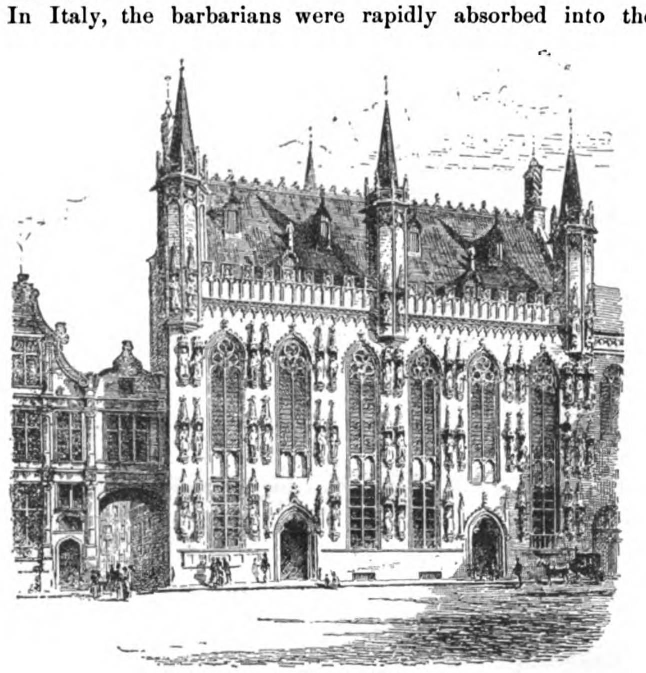


Fig. 4. Bruges.

native masses and the Italians were early able to resume the municipal organization established by the Romans. We therefore find numerous town-halls dating from the eleventh, twelfth and thirteenth centuries. Here, it was no longer a

[1] From the French of E. Rümler, in Planat's *Encyclopédie de l'Architecture et de la Construction.*

struggle against the feudal lord, but against the neighboring city; or, the city was divided by civil dissensions into two camps that disputed with each other its government. For these reasons, the town building called the *palazzo publico* or

Fig. 5. Basle.

palazzo del municipio had the same characteristics as in France. See, for example, the *palazzo del comune* of Piacenza (Fig. 1). It dates from 1281 and is crenellated like a fortress. Its broad arcades are spacious enough to accommodate the people and the merchants, and the crowd can be addressed from the balcony above. The same general appear-

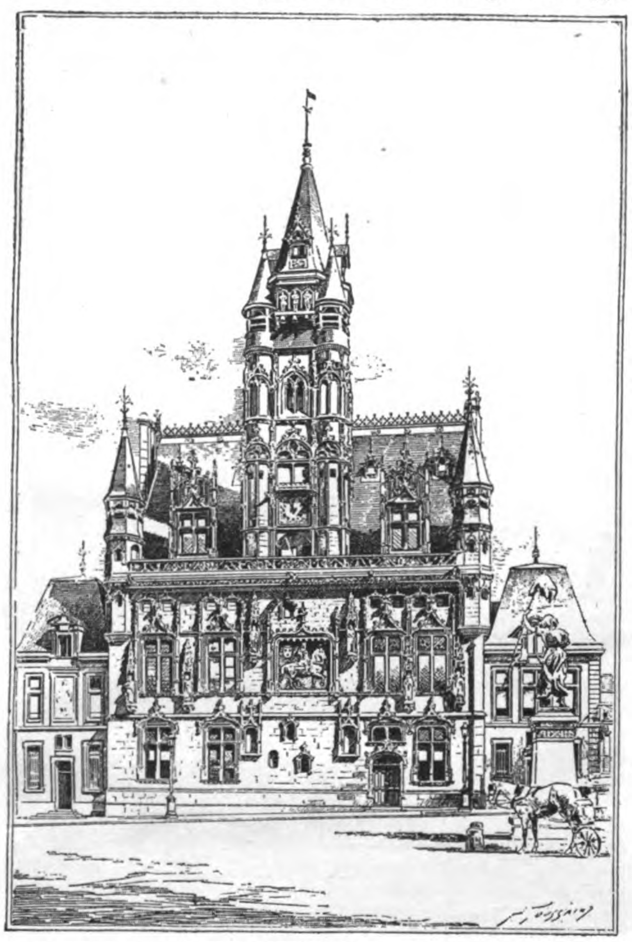


Fig. 6. Compiègne.

ance is exhibited in the superb Palazzo Vecchio of Florence [See *American Architect* for February 1, 1890, "Civil and Domestic Architecture," Figure 14], begun in 1298 by Arnulfo di Lapo. The *palazzo publico* of Perugia is more modern (beginning of fourteenth century); there are therefore more openings in the walls, which look less like rampart walls, although the battlements preserve the warlike aspect of

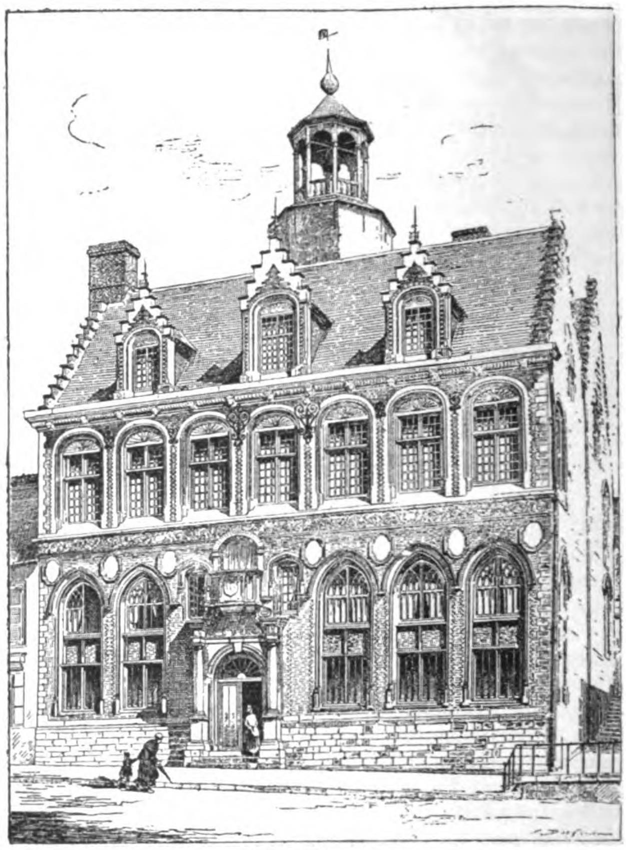


Fig. 7. Cassel.

the edifice (Fig. 2). The little town of Pienza, south of Sienna, contains a small town-hall, of more recent con-

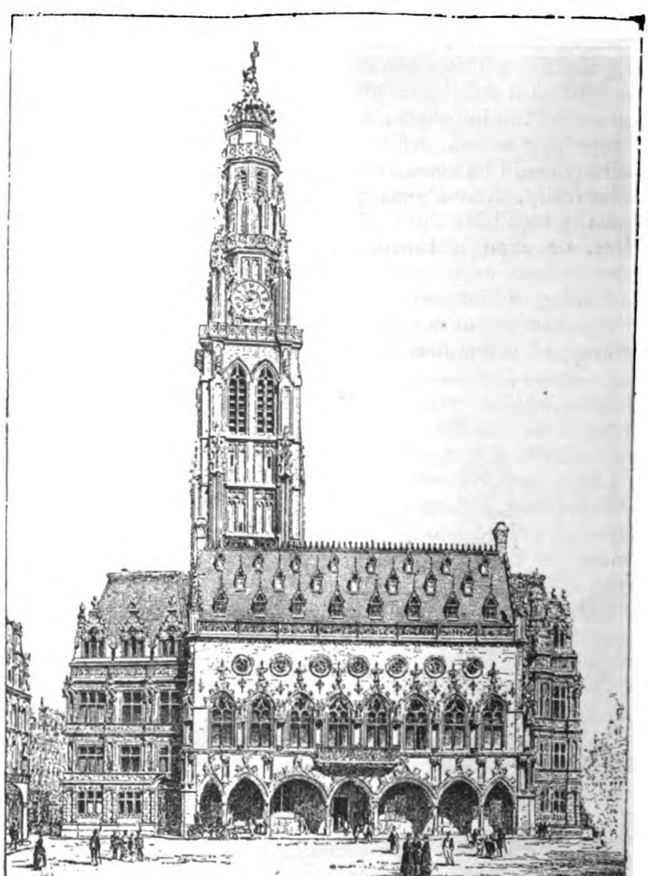


Fig. 8. Arras.

struction, which likewise shares these various peculiarities (Fig. 3).

The origin of town-halls being thus precisely determined, it

only remains for us to pass in review some of the principal types that have been conceived down to the present day in different countries, following as far as possible a chronological order.

From mediæval times Flanders and the Netherlands possessed a very advanced municipal organization. Many splendid town-halls therefore exist in these countries. One of the most famous is that at Brussels [See *American Architect* for February 1, 1890, "Civil and Domestic Architecture, Figure 13]; it stands in the interesting and picturesque Grande Place, all the other edifices of which belong to the same period. The town-hall of Bruges (Fig. 4), reared in the second half of the fourteenth century, is less important, although it is designed in a noble style. Singularly enough, the arcades are wanting.

Cassel and Arras, both of the sixteenth century (Figs. 7, 8). The latter is one of the most remarkable monuments of northern France, and its lofty belfry was one of the last of the type to be built. At Cassel, the brick construction introduces a new decorative element.

As specimens of French architecture of this period the Capitole of Toulouse must be cited, and, more particularly, the Paris Hôtel de Ville, begun in 1553 after the plans of Domenico of Cortona. Figure 9 shows it as it was originally designed and as it existed until successive additions transformed its character. The new plans will be found in the *American Architect* for February 1, 1890, ["Civil and Domestic Architecture," Figures 18, 19 and 20].

[To be continued.]

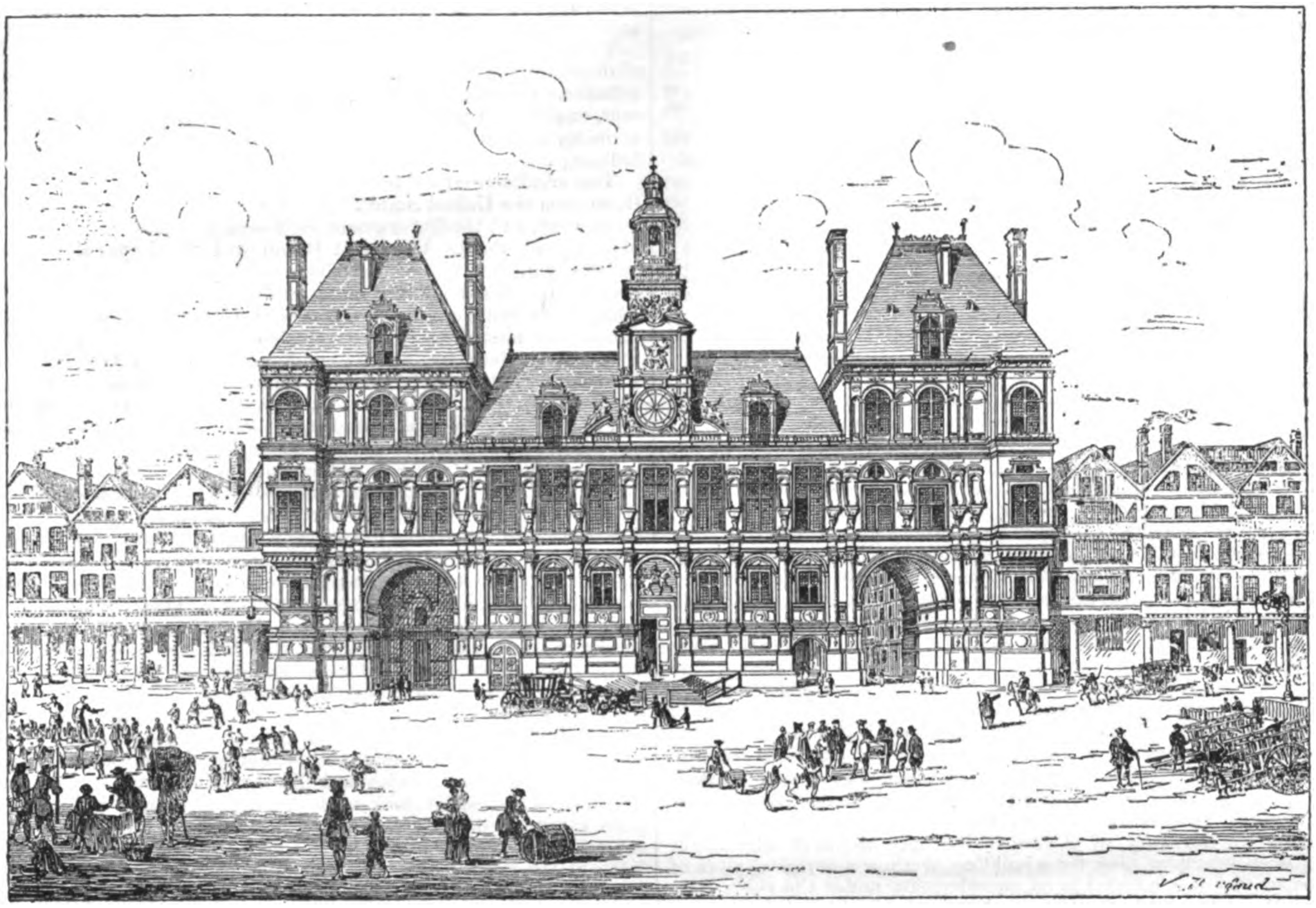


Fig. 9. Paris.

There are still a few town-halls in Germany that come down from Gothic times. For these, we refer the reader to the article entitled "Gothique Allemanand," where, on page 26 and from Figures 24 and 25, he will be able to glean some facts concerning them. The Renaissance, on the contrary, has left a very large number of civil monuments in this country. As chief among them we cite the town-halls of Esslingen, Augsburg, Rothenburg, Halberstadt, Schwalenburg and Bremen, reproductions of which have been given under "German Architecture" [See *American Architect* for August 29, 1891, *et seq.*]. The neighboring country of Switzerland displays an architecture quite similar to that of Germany. We may therefore add to the examples just cited the fine town-hall of Basle. Although erected in 1508, the tradition of battlements, which were then perfectly useless, still survived (Fig. 5).

In measure as manners refined, the barbarous aspect disappeared from the construction. Defensive features were converted into mere decorative motives, and the campanile superseded the belfry, which it was designed to recall.

We cannot pass over in silence the classic town-hall of Compiègne, in France, erected in the fifteenth century. Its beautiful belfry, crowning the interior staircase, rises above an equestrian statue of Louis XII. The lateral watch-towers are the last vestiges of the fortress of former days (Fig. 6).

Farther north, in French Flanders, several interesting edifices are still to be seen; for example the town-halls of

THE GREAT EXHIBITION REVIEWED.[1] — V.

THE EXTENT OF THE FINE ARTS EXHIBIT.

THE enormous extent of the exhibits in the Department of Fine Arts is little realized even by those who have spent many days in it. The revised catalogue that was only issued in September covers 506 pages. The first official catalogue that was issued in May covered only 196. It was very defective, having been hastily prepared, but is still valuable, as the names of the artists of each country are given in alphabetical order, and the numbers of the works of each artist follow his or her name. These can also be ascertained from the revised catalogue with little more trouble, for the names of artists of all countries are consolidated in the Index of Artists at the end, and after each name follows the country, the classification and the revised numbers of the works. For in order to issue the revised catalogue it was necessary to give in *red* new numbers to all the works, while the old numbers in black are also retained. Some pictures also retain the numbers used in previous exhibitions and this also produces confusion for those not well informed. This list of artists is very valuable. It covers forty-four pages of fine print in double columns. In the new catalogue the pictures and other works of art are numbered consecutively as they are placed, and the name and residence of the artist precedes each title. There are headings for each room and alcove and sub-headings for each side of every room.

In order to make the whole scope of the exhibition clear in as brief a space as possible we have compiled a table showing the number of contributions from each country subdivided into classifications. The great diversity of works of art, especially from foreign

[1] Continued from No. 931, page 49.

Country.	Sculpture.	Oil-paintings.	Water-colors.	Chalk, charcoal, pastel and other drawings.	Engravings, etchings and prints.	Paintings on ivory, enamel, porcelain, cameos and carvings.	Architecture as a fine art and decoration.	Additional, not classified.	Totals.
United States	160	1,116	220	548	634	16	308		3,002
U. S. Loan Collection	4	122							126
Austria	16	132	18						166
Belgium	46	203		43 [1]					292
Brazil	5	114	9			7			135
Canada		132	64						196
Denmark	18	158							176
France	138	466	59	27	136		160		
France	Groups 143 and 145—miniatures, medals, etc.[2]							75	
France	Groups 142 and 145—objects of decorative art							132	
France	French Historic Sculptures (casts)							116	1,309
Germany	113	420	101 [3]		59		187		880
Great Britain	50	450	205	72	182		146		1,105
Holland		188	111		27				326
Italy	172	203	25		28				
Italy	Reproductions of Classical bronzes							112	540
Japan	20	3	47		3		4		
Japan	Decorative arts, including embroidery, tapestry and porcelain							265	342
Mexico	13	82	2		8	5			110
Australia	5	104	121						230
Norway	7	130							137
Russia	16	117							133
Society of Polish Artists.		122							122
Spain	47	183	Pictures not classified					181	411
Sweden	19	113	Pictures not classified					92	224
Venezuela		22		3					25
	819	4,580	982	693	1,077	28	805	973	9,987

[1] This includes a few water-colors and etchings.
[2] This includes pastels.
[3] This includes also cameos, aquarelles, porcelains, pastels, sketches in oil and pencil, charcoal, engravings, wax panels and enamel paintings.

countries, was such that they could not be brought into the classifications officially announced in advance; but no difficulty was encountered in classifying sculpture, oil-paintings, water-colors and architectural drawings. Architecture is recognized officially only in its aspects as a fine art and is classed with decoration, being known as "from groups 139 to 145 inclusive," 139 is sculpture, 140, oil-paintings, 141, water-colors, 142, paintings on enamel or metal, on porcelain or other wares and fresco-painting on walls, 143, engravings, etchings and prints, 144, chalk, charcoal, pastel and other drawings and 145, antique and modern carvings, engravings in medallions or in gems: cameos and intaglios. Here was certainly a wide range; any architect who could display his ability in either of these media was welcome to exhibit provided his works could pass the Jury of Admissions, or receive the consent of the Commission of the country in which he was born or resides. Any draughtsman or "architect's artist" could exhibit a drawing of his employer's work, or anybody else's work for that, and receive a medal for it, if approved by the Jury of Awards. But any architect who might devise an excellent plan for a building or show an original piece of construction was entitled to no consideration under the rules. He might have been turned over to the Department of Liberal Arts, but investigation has not been made in that direction. It is, however, a fact that architects who exhibited complete plans of buildings received medals in that department, and that the architects of the World's Fair Buildings received medals through the same judges and not in the Department of Fine Arts. None of the architects who exhibited designs for buildings erected on the World's Fair grounds in the Fine Arts Department received medals in that department. In short, architectural picture-making has been recognized as a Fine Art, but Architecture itself has only been recognized as a Liberal Art. And yet in the American Fine Arts section the decorative arts allied to architecture, which were exhibited correctly according to the classification with architectural drawings, among which were the designs of Louis C. Tiffany, Henry Thomson, Frank Fowler, Robert Reid, Miss Mary McDowell and Edward P. Sperry, received no recognition from the Jury of Awards. But in the Departments of Manufactures and Liberal Arts, the works that resulted from these designs fared better.

The only countries making distinctive architectural exhibits are the United States, 308 numbers, Germany, 187 numbers, France, 160 numbers and 116 casts of French historic sculptures—mostly of mediæval and early Renaissance Architecture—and Great Britain and Ireland, 146 numbers. Japan sends no drawings, but four superb models one of which is a working-model of the Yasaka Pagoda by Keiské Niwa, the others being parts of ancient temples. There are a few architectural drawings classed as water-colors in the Austrian section. All the architectural exhibits are distinctively national except those from the United States; for whatever nationality we may have in our architecture as executed, there is certainly little shown in the architectural drawings that we exhibit. The largest spaces are taken up by projects executed by students in the École des Beaux-Arts at Paris, and drawings in a similar style by young men who have not yet achieved professional reputation. The only exhibit showing the extent and range of work of the men who offer them are those of Carrère & Hastings and McKim, Mead & White of New York. Most of the other drawings are perspectives by architect's artists, and justice has been generally done by inserting their names in the catalogue as well as those of the designers. Babb, Cook & Willard, of New York, exhibit perspectives of all their best works, admirably drawn and doubtless autographic work. H. Langford Warren's works are also well shown and drawings are accompanied by photographs which attest their fidelity. The general execution of all other drawings shows originality of rendering, as well as the characteristics of many foreign nations.

The English architectural drawings are nearly all autographic, and generally show perspectives without other accessories. The leading men of the day are represented. Among them may be found Prof. George Aitchison, R. R. Anderson, Geo. C. Ashlin, Aston Webb & E. Ingress Bell, R. Blomfield, James Brooks, Sir Thomas Deane, R. W. Edis, Ernest George & Peto, Herbert Gribble, John L. Pearson, J. Oldrid Scott, R. Phené Spiers, the late Geo. Edmund Street and Alfred Waterhouse. Some of the drawings antedate the Philadelphia Exhibition.

This cannot be said of France, for while there is a great display of drawings, most of the leading men are missing. Many of the contributions are complete sets of drawings of the buildings they represent, executed in the usual exact manner that results from academic training, while others show the progress of restorations in ancient buildings.

The architectural exhibits of Germany are almost as varied as those from the United States. A large part of them are of Government work, and the Government itself is represented by the Imperial Ministry of Public Works at Berlin and the Imperial Ministry of the Interior which contribute thirty-eight exhibits. This country is also notable for its splendid architectural models, which have been elsewhere referred to in the *American Architect.* Among the most distinguished contributors are Ende & Bockmann, Prof. G. Hauberisser, K. Hofmann, Kayser & von Groszheim, E. Klingenberg, Prof. Skjold Neckelmann, Prof. A. Schmidt, Prof. Freiherr H. von Schmidt, Bruno Schmitz, Franz Schwechten, Prof. B. Spitta and Paul Wollot. There is also in the gallery a very instructive exhibit from the Royal Photometric Institute that ought to be secured by some public museum.

Our table shows a total contribution of works of art numbering 9,987 or practically 10,000. The revised catalogue in a summary gives a few more than this. The difference is due to the difficulty of classifying such a vast quantity of miscellaneous works, and to the fact that many of the foreign commissions have mixed them up in their method of hanging and displaying them. These represent the labor of the enormous number of 3,758 artists, and average 2.65 works to each artist. Allowing that a man should devote half a minute to each work it would take him nine and one-fourth days of nine hours each to see them all. Some of the works in the revised catalogue are in the Foreign Buildings. These were also visited by the Jury, but the total number of these will not exceed 350. Among them should be mentioned the works of Arturo Michelena, Cristobal Rojas and Herrera Toro in the Venezuela Building, all of which took medals. Had the works of Michelena been shown in the Art Palace they would have created a genuine sensation. In our table the unclassified list is due to the fact that some of the Foreign Commissions mixed together works that could have been classified and separately catalogued had they chosen to do so. Those of Spain and Sweden are pictures, mostly in their Government buildings. The French objects of decorative art are generally in glass cases and are of the same nature as the decorative art works of Japan though of entirely different design. The French historic sculptures occupy the east nave of the main Art Palace and comprise mainly duplicates of casts now in the Trocadéro at Paris, which have been secured by the Art Institute of Chicago.

The sections given to foreign countries were placed under the absolute control of the commissions of those countries. France, Germany, Japan and Austria decorated all their rooms and courts. The United States rooms only are under the direction of the Department of Fine Arts, and, also the policing and cleaning of the entire building. The main interests of visitors centre in the oil-paintings and sculptures, and there does not seem to be any preference for any one country; for all the galleries are equally crowded. If there is anything resembling a remote corner it is sure to be filled like all other places, and ten thousand is probably not a large estimate of the number of persons that may be found in the Art Building on any day. To the lover of art it is the most inestimable privilege that has ever been enjoyed to see under one roof this fairly representative collection of the works of all nations, many of which have never before contributed to an International Exhibition and most of which have never before sent any to America. The vastness of the exhibit and the practical impossibility of seeing all of it has operated to the disadvantage of the 982 water-colors, the 693 examples of black-and-white and the 1,077 etchings and engravings. While these were necessary to a complete exhibit of the progress of any country in art the futility of having them duly seen and appreciated is illustrated. The number of paintings on ivory, enamel and porcelain is small as classified, but this represents but a small part of what may be found in the unclassified summary. New classifications would have been necessary for properly grouping them and this would have made at least ten columns in our table. The placing of objects of art in the Fine Arts exhibit, while it includes

but a small part of what might have been worthy of similar distinction if selected from other buildings is an evidence of progressive thought and advancing appreciation of the growth of Fine Art in its application to every branch of manufacture, for which all honor is due to the administration of this department. P. B. WIGHT.

[To be continued.]

THE MID-WINTER FAIR. — THE CREMATION SOCIETY OF SAN FRANCISCO AND ITS NEW CREMATORY.

IT is said, "many men, many minds," but in the name of things sacred, what manner of man is he who could think of two fairs on one continent in the self-same year. So vast has been the sweep of the great gathering at Chicago, that one would imagine that only audacity of the most pronounced type could think of suggesting other fairs while this immense one is still incarnate; yet even while the fair at Chicago is still in full blast, a prophet has arisen in the west who has not been afraid to mention a fair for California.

When first I read of this undertaking, I said with many others, this will end in one of two ways, either it will be a failure financially or else spectacularly; for if they make more than a very common show of it, it will not pay, and if it is made to pay, the public will be disappointed, for they will be brought together under false pretences; it will be as with some of our troupes of travelling players, all show-bills and no show. These assumptions, however, look as if they were to be negatived. Times are hard, as they always have been, and doubtless somewhat harder than usual, and money must be kept in circulation somehow, for even unprofitable trading is better than no trading at all, and so the citizens generally (though not without some diffidence) have taken hold of the idea, and intend to make an experiment in the art of stimulating trade.

The proposition is to bring to San Francisco from Chicago the most popular of the exhibits, presuming that their owners see their way to re-exhibit here at a profit, a possibility which we very much doubt so far as works of fine art are concerned. However, even if we get half that which talk might lead us to anticipate, we shall do very well.

The site selected for the fair is the Golden Gate Park, which offers a very beautiful, though entirely artificial, setting. In the days of long ago (viewed as San Franciscans view it, that is about ten years ago) the whole of what is now the western portion of the city was a waste of drifting sand, a desert in which a landmark of the morning, such as a five-foot fence, became a matter of history by sundown, so rapidly did the sand drift. On such a beginning our beautiful park rests. About eight acres, near the centre of this public domain, have been levelled off, and building operations are about to begin.

Everything, so far, has been done in a great hurry; but if the results prove as successful in all departments as they have in the matter of designs prepared for the buildings, the originators of the idea may feel justly proud.

At first it was rumored that an architect lately from Chicago was to furnish the designs, and delight us as no local designer could do. The architects of the city thought differently, and said, approximately, if there is carrion in this, why not let the local vultures have their share. This protest brought about a competition which was very fortunate, for the design submitted by the architect who originally was to prepare all drawings was so vastly inferior to the rest submitted, as not to bear comparison. The best designs were submitted by Mr. A. Page Brown, and two out of the five accepted. That also by Mr. Swain for the Mechanical Arts was most satisfactory; as to the others the less said about them the better, especially the Fine Arts Building which is to be a permanent structure, and it might be added, a permanent eye-sore.

There are to be five buildings in all: the Administration, Fine Arts, Mechanical Arts, Manufactures and Agriculture; the latter four averaging in area 200′ x 450′. The materials to be used are similar to those used at Chicago, viz, wood covered with staff, but instead of painting the buildings white, it is proposed to substitute rich colors after the manner of the Orient so as to harmonize with the style of architecture. The estimated cost of these buildings is $500,000, the greater portion of which has already been subscribed by the citizens, and with the sale of special privileges and the gate-money, it is calculated to be able to pay all the other necessary expenses. It is intended that the exhibition shall be in order by the first of the year, but whether they succeed in accomplishing so much in so small a space of time is doubtful.

We live in hope that the fair may be a great success, both commercially and æsthetically, for we feel the need of such a stimulus, living as we do far from the heart's throb of the arts and crafts, and becoming lukewarm about these things when more fortunate cities are aglow with enthusiasm.

The Cremation Society of San Francisco has, after a number of years occupied in discussion, at last materialized their theory in the form of a new building and are now prepared to undertake the business of fire-burial. The building has been equipped after the manner most approved and the Society expects to do a profitable business at the rate of $65.00 per body. The heat generated in the chamber is about 18,000°, and one hour is required to complete the process. Thirty thousand dollars have been expended on the building.

Unfortunately, from my standpoint, the originators of this enterprise and others appear to view the matter too much from the practical and sanitary aspect of things and not enough from the poetical and emotional.

The building now completed for the San Francisco Crematory Company is about fifty feet square on plan, is two stories in height, that is a main story and basement, and is surmounted by a dome. The smoke-stack is quite unarchitectural and is placed at the rear of the building and is detached from it. This later arrangement is not as it should be, for the fundamental idea embodied in a crematory is the fire and the furnace. A crematory is not a factory in which the fire, and the power it develops, is simply a necessary adjunct, but is a building in which the fire is everything and the chapel and surrounding buildings but secondary in importance.

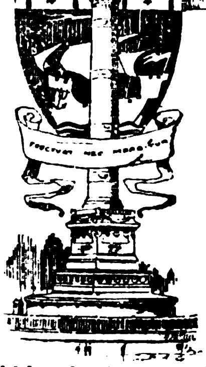
In the crematory as designed here, a flight of steps leads to the chapel or auditorium, which is the main feature of the building. The chapel is square on plan and roofed over by a dome-shaped ceiling, in the centre of which diffused light is admitted, this of course gives a very pleasing effect as it always does.

On the arrival of the burial party the body is taken to the vaults below for preparation, while the followers enter the auditorium and become seated. At one end and facing the audience is an elevator in the form of a sarcophagus by which the body and casket are raised after being prepared. The preparation consists simply in placing an alum-soaked sheet around the body which protects it slightly on entering the furnace and enables the ashes to be more easily collected after the burning is completed. A special device for removing the coffin from the furnace and leaving the body behind is also a part of the apparatus.

Then follows the ceremony and again the body descends, but not into the furnace, for again after the nearest and dearest have taken their last farewell, the body has to be subjected to the touch and gaze of the stranger, and only in the case of such who wish to see the end can the last act be witnessed and this necessitates descending into the basement, which has not about it the poetry and dignity that I think should belong to it.

Externally, as I have said, the smoke-stack should be the striking feature and internally the furnace and its door: it should face the spectators and be on a level with them, so that when the final ceremony has been performed and the last look has been taken and the priest shall say in tones of gravity, "As from the furnace of a new creation the sun-gods fashioned thee, making thy body of clay as also thy spirit of light, so in thy time of regeneration let the body return unto the fire from whence it came and the spirit unto light and life eternal."

Then shall the body be passed into the glowing effulgence of that great purifier which has throughout all ages been unto men as the sign and symbol of that for which they labor.



DEATH OF M. ADOLPHE YVON, PAINTER. — CHANGES IN THE QUARTIER DES ÉCOLES. — THE LYCÉE LOUIS-LE-GRAND. — THE NEW LAW SCHOOL. — THE EXHIBITION OF 1900.

AT this moment there may be seen at the World's Fair in Chicago, in the French section of the fine arts, the full-length portrait of M. Carnot, President of the Republic. The author of this portrait, the painter Adolphe Yvon, died on the 13th of September last. He was born in 1817, at Eschwiller (Moselle), and came to Paris at about the age of twenty years, drawn thither by his taste for the arts. He entered the studio of Paul Delaroche, and was received at the École des Beaux-Arts. Being obliged to live by his labor, he could not follow the course at the School long enough to take part in the competition for the Prix de Rome, but he carried to a great length the study for his design, and in 1847 obtained the first medal at the Salon with "Les sept Péchés capitaux, d'apres le Dante." These magnificent drawings were purchased by the State, and sent to the Museum at Le Havre, where they still are.

Adolphe Yvon devoted himself to historical painting. From a journey into Russia he brought back documents bearing on the costumes and customs of the country, from which he drew great

profit in a series of water-color sketches, which to-day are scattered through divers collections. His first great painting was the "Retreat from Russia," exhibited in 1855, which earned for its author the cross of chevalier of the Legion of Honor. To-day this painting is in the Museum at Versailles, from which it was removed during the Exhibition of 1889, for the sake of being shown at the centennial exhibition in the Champ de Mars.

Under the Empire, Yvon was sent to the Crimea to follow the military operations, and during this campaign he made a series of large paintings, which made him famous, the principal one of which is the "Taking of the Malakoff." This painting, exhibited at the Salon of 1857, earned for its author the first of the "medals of honor" ever awarded at the Salon. After this came "La Courtine" and "La Gorge de Malakoff." The success he had made in this undertaking procured for M. Yvon, at the time of the war with Italy, a new commission from the Government. He followed all the military operations, and painted two great pictures, the "Battle of Magenta" and "Battle of Solferino," which are also hung in the galleries at Versailles.

After the Universal Exhibition of 1867, M. Yvon was nominated officer of the Legion of Honor and professor at the École des Beaux-Arts, where the greater number of the young painters of the present generation worked under his direction. Since the war, Adolphe Yvon devoted himself almost exclusively to portrait-painting, and exhibited every year at the Salon. This year he sent the portrait of Doctor Auvard and that of M. Felix Grélot, Secretary-General of the Prefecture of the Seine. The portrait of M. Carnot, now at the Chicago Exhibition, dates from 1888. He also painted those of MM. Paul Bert, Rouvier, Constans (1891), Minister of the Interior, and of Doctors Peau, Germain Sée and Peter. His style was classic and he was accused of a dryness of handling, rather too "official" in character; but the drawing was beyond criticism, a thing which is to-day becoming rare, and his manner, although academic, did not lack vigor. In any case, the name of Adolphe Yvon will remain that of one of the grand painters of our time.

The Quartier des Écoles is in the way of being transformed and is losing the last traces of its old university buildings. The New Sorbonne is being finished about the ancient church, which alone is preserved. The old court is demolished. The buildings dating from the seventeenth century have disappeared, and the new ones rear themselves clear and luminous in place of narrow and foul streets. Like the Sorbonne, *vis à-vis* to which it is in the Rue St. Jacques, the Lycée Louis-le-Grand is being enlarged and partly rebuilt. At first the two extremities were taken in hand, preserving up to the last the ancient façade between them, through which for more than two centuries generations of scholars have penetrated within the most celebrated of our Parisian schools. It is going to serve for the last time for the return of the scholars in the month of October. Then the demolishers will take possession of it, and will throw down the old and historic walls. It was in 1563 that the Jesuits purchased the Hôtel de Langres on the Rue St. Jacques: there they opened a college, in which, in opposition to the University, which demanded payment from its students, instruction was given gratuitously. From this arose the great struggle between the University and the Jesuits, who had the ability to secure a strong position in the court of Henri III, who, in 1582, came to lay the first stone of the college chapel; but under Henri IV, as the result of an attempt at assassination of the king by Jean Chatel, a person who had been one of their pupils, the Jesuits were expelled in a manner which was rather of a temporary character. In fact, when in 1628, after the plans of the architect Augustine Guillain, they caused the buildings of the college to be re-erected (the very ones whose façade is about to be demolished), the Prévôt des Marchands and the sheriffs of the City of Paris were present at the laying of the corner-stone. From that time the college increased in every direction, and in twenty years the Jesuits had purchased the buildings of the neighboring colleges, to wit: the Collége du Mans and the Collége de Cholet, on the side of the Rue des Grès, now the Rue Cujas, and also the Collége des Marmousets, on the side of the Collége de France. Instruction was directed mainly toward the ancient languages; but the Jesuits, who wished to instruct the sons of the noblest families, were forced to give considerable heed to all the social arts needed to enable a man to make a good appearance at court: fencing, writing and even dramatic art were a part of the curriculum. They brought out plays at which were present princes of the royal house. Louis XIV came thither in 1674, and declared himself enchanted with his college. This speech was enough to cause the Jesuits — who, above all things, were practical — to affix above the door a marble panel bearing the inscription, "Collegium Ludovici Magni." This name was restored to the college after the Revolution, during which it was successively called "Institut des Coursiers," "Collége-Égalité," "Prytané Français." But at this time the Collége Louis-le-Grand belonged to the University, which took possession of it after the expulsion of the Jesuits in 1672. During the Reign of Terror, the buildings were used for prisons, and for one night as a barrack for the Marseillais who had come to Paris.

Since the beginning of the century the Lycée Louis-le-Grand has maintained the highest reputation from the point-of-view of instruction. The enlargement proposed and already executed will make it one of the most interesting from the point-of-view of scholastic luxury. At the moment is being studied the decoration of the Salle des Fêtes, in which hereafter will be given the annual concerts, which are so highly esteemed by pupils and parents, who come thither to listen to the best artists of Paris.

In front of the Lycée Louis-le-Grand, the buildings of the Law School find themselves very properly placed. For a long time complaint had been made of the insufficiency of the amphitheatres and all of the other services. Thanks to the understanding arrived at between the City of Paris and the State, three and one-half millions have been reserved for the purchase of a group of buildings between the Rue Soufflot, the Rue St. Jacques and the Rue Cujas. Upon the site of these old houses is being built at this moment buildings which will contain the lecture-hall for the library, two amphitheatres and different lecture-rooms.

Seven years still separate us from the expected date of the next Universal Exhibition. The Exhibition of 1889 is still so fresh in the memory, that it seems as if this haste to busy one's self with its successor were a little excessive, and yet the Exhibition of 1900 was decreed on the 13th of July, 1893, eight years before the opening. This is not at all bad, but still better has been done: the President of the Republic signed, on the 9th of September last, the decree regulating the organization of services, in consequence of the report which had been addressed to him by the Minister of Commerce, Industry and the Colonies, M. Terrier. This gentleman is of the opinion that "the exceptional importance of the work, the difficulties which may arise from the partial conservation of the buildings in the Champ de Mars, the intricate problems which are connected with the means of access and transportation, whatever may be the place actually selected for our grand pacific sessions of 1900, all demand a period for elaboration much longer than was required by earlier exhibitions." Why, one might ask the minister of to-day, who perhaps will not be in office in 1900, did not the Exhibition of 1889 have an exceptional importance? Were not the problems connected with the means of access and transportation then also intricate, since M. Terrier declares that they are whatsoever may be the selected spot? And yet it was only decreed on November 8, 1884, less than five years before the opening, and it was only on July 28, 1885, that the ministerial decree relating to administrative service was issued. Why this haste now? What is its object? It is all the more inexplicable, since in the terms of the report itself the arrangements proposed by the minister in the matter of organizing the services "reproduce those of 1889, with some exceptions, which carry their own justification. As in 1889, the service will be placed under the authority of the Minister of Commerce, Industry and the Colonies; but, according to tradition, which may be called a fixed one, which has been only once interrupted, they would have over them a general commission endowed with extensive powers and having a broad initiative. . . . The distribution of services differs little from that which has undergone its test at the Exhibition of 1889. It will be enough for me to point out the division of labor into two distinct groups corresponding, one to architecture, the other to the art of engineering. That eminent man is no more who, thanks to a knowledge and talent and authority beyond discussion, knew how to unite and direct the whole of the works of the last Exhibition. . . . As in the case of the active services, a superior commission, a sort of grand council would lend to the Government the assistance of its advice on those important questions which might be submitted to it by the ministry. This superior commission, very ably constituted, would be recruited in the Chambers, Council of State, Concil General of the Seine, the Municipal Council of Paris, the academies, the upper officers of the Administration, the chambers of commerce, the grand banking establishments, the learned bodies, the superior professional teachers, the forwarding agents, the metal workers. Competence of all kinds and every interest would be strongly represented in the body [Take particular note of this phrase]. The minister could nominate the directors and heads of departments only little by little, as occasion might demand. But the Commissioner-General would be immediately appointed. He could thus prepare with the greatest maturity of reflection the practical work, of which the heavy burden would be placed in his hands." (*Extracts from the report.*)

As the result of this report the President of the Republic signed, on September 9, the decree organizing the service of the Exhibition of 1900, and appointed a consulting commission, called Commission Superieure de l'Exposition. This personage is M. Alfred Picard, President of a Section of the Council of State, Reporter-General of the Exhibition of 1889, Vice-President of the Preliminary Commission of the Universal Exhibition of 1900.

As to the Superior Commission, composed of a hundred members, it has been chosen in such fashion that, after the phrasing of the report quoted above, "competence of all kinds and every interest would there be ably represented." In fact, so they all are. Only one ability, only one single interest, quite unimportant, it is true, in an exhibition which counts in the framework of its services the direction and control of the architecture, has been forgotten. No single architect has been named on the Superior Commission. The president of the Societé des Ingenieurs Civils has not been forgotten; nor yet the president of the Compagnie des Bateaux-Parisiens, and still less has been forgotten a representative of the press. But one could never have thought of the president of the Societé Centrale des Architectes Français, or any other architect having ability at

least equal to that of some one of the eight senators, the twelve deputies, or even the eight municipal councillors, who will form part of this Superior Commission; and yet did not architecture form the greatest part of the success in 1889? But in France our profession is accustomed to indifference and ingratitude.

LEGAL POINTS IN PRACTICE.

THE legal and architectural minds are often at variance, and these differences are no doubt due to constitutional habits of mind. Dealing with hard facts and the weight of evidence, it is not extraordinary that a lawyer should so often overlook those motives and impulses which form so large an incentive to action in matters of business, nor strange that when they have to deal with any question of architectural practice, like professional remuneration or the custom of architects, they should so often run counter to the general opinion of the profession. The nicer questions involved in the consideration of art are regarded too frequently as mere sentiment that cannot be seriously entertained or put in evidence, and it is from this point-of-view that terms are often interpretated in a sense quite differently from that which the framers of the statute intended. On the contrary, it will be argued that architects, and in fact, all artists, are mentally incapacitated from dealing with the nicer points of evidence when they arise on matters of law; that men who develop their imaginative faculties more than their logical are disposed to discount facts. Each profession has its own natural bias; but it will be truer to say that each may learn something of the others, that both bents are reconcilable, than that lawyers are right or architects wrong, or *vice versâ*. It is, perhaps, a hopeful thing that our competition designs and questions of taste are not submitted to a court of law, or we might find that many of our dearly-cherished ideas would be shattered, and that what we consider artistic qualities and features would be ruthlessly treated. We might, indeed, be pretty certain that Her Majesty's judges who preside over our Courts of Justice in Fleet Street would deal harshly with all Gothic or Mediæval designs since their domicile in their new courts. We might, indeed, hazard the conjecture that the Classic styles would find most favor; that the imposing masses of the Palais de Justice at Brussels, with its impressive columnar façades and porticos, would be considered more in character with the majesty of the law. In these matters architects have, happily, their own way, though they might occasionally be gainers by the infusion of a little law into their artistic creations when they become rather eccentric and effusive.

But in their own sphere of law the legal profession have also their own way. Frequently the questions that are brought before the courts touch very closely the architect's functions, and to these we now chiefly allude. Of all others, the architect's certificate is very intimately connected with the exercise of his profession. A certificate is really an official statement of opinion of the value of a certain amount of work performed, and is equivalent to the award of a referee. Of what use is an architect unless his certificate is honored? It may be called "a mere formal instrument," yet it is not on this account less, but rather more, binding; it implies consideration and calculation, for an architect that is worth the name would not put anything in black-and-white and sign it, unless it was a deliberate act. In law, it is the "condition precedent" to the establishment of a claim by the builder; it is a conclusive and final opinion that he is entitled to a certain payment for any extra work, even if no written order is given or can be produced. On the other hand, no builder can bring an action against an architect unless he can prove fraud or collusion, for it has been decided that when an architect carelessly or negligently performs the work required to give a certificate, so that the builder does not receive all that is due to him, he cannot bring an action against the architect if no fraud is alleged Quite recently a case came before the Court of Appeal ("Lelièvre, etc. *vs.* Gould") which bears on the question of architects' responsibilities. The plaintiffs sought to obtain a declaration that the defendant, a surveyor, was liable to make compensation to them for loss they had sustained by reason of untrue certificates which he had given as to the progress made in building certain houses. The defendant denied the allegation, saying that in giving the certificates he had acted *bonâ fide* in the belief that they were true statements. The official referee before whom the action was referred found there was no fraud on the part of the defendant, but that in giving the certificates he did not use due skill, and acted with negligence, but that there was no contract between the plaintiffs and defendants, and that therefore the latter was not under any obligation towards the plaintiffs. The latter applied that this order for judgment should be set aside. The Divisional Court refused the application, and the Court of Appeal confirmed it. It is admitted by the *Law Journal* that "this decision has finally settled the much-debated question whether the architect under a building contract is under any liability to the builder for any inaccuracies or any act of omission in the discharge of his duties under the contract." It asserts in such cases there is no privity of contract between architect and builder; the architect's duties are towards the employer only. For neglect of them he is responsible in damages, and is not, as was supposed by the profession, entitled to the immunities of an arbitrator to protect himself by his certificate from his own negligence. By this decision it is established — (1) That unless the architect is guilty of fraudulent conduct, he cannot be called to account by the builder for any omission or inaccuracy under a contract, as there is no privity of contract between them. (2) This decision has consequently also established the fact that a surveyor or valuer employed by a mortgagor to make a valuation owes no duty to the mortgagee, as was affirmed in the case of "Cann *vs.* Wilson," and is, therefore, not liable to him for any loss alleged to be sustained. (3) Similarly in the case we have cited a building owner's surveyor is not held to be liable to the builder's mortgagees for losses alleged in giving his certificate. The decision of the Court of Appeal is reasonable. A building owner's surveyor, in giving his certificate of value of certain buildings, is bound to safeguard his client by not valuing at too high a rate the property. He would naturally estimate the value of the houses rather below than above the recognized proportion. An architect, in the same way, would have first to look to his client's interest, and if by any neglect he causes damage to him, he is responsible, and cannot plead any justification; but to the builder he is not liable for any omission or inaccuracy, so long as nothing fraudulent can be proved against him.

In connection with this point we may allude to the finality and binding character of an architect's certificate. Builders do sometimes extraordinary things: they bind themselves by contract to perform impossibilities, to carry out work within a ridiculously short time, and they sign their own death warrant by accepting clauses which on the face of them look too extravagant to tolerate for a moment. About a year ago a report of a case in the *Times* showed how contractors will commit themselves to a course of action which gives them no room for escape. The committee for a free public library entered into a contract with a builder for building the library. In the contract there was a clause which stated that the certificate of the architect was not to be set aside, for, amongst other things, "any pretence, suggestion, or insinuation of fraud, collusion, or confederacy." The contractor brought an action against the committee as to the validity of the clause. The case was tried in the Chancery Division, but the action against the committee and their architect was dismissed, the judge remarking, that contractors did accept clauses which to a lawyer were terrific, but they did it as business men with their eyes open, for better or worse. The plaintiff admitted that no charge of fraud was made, nor had they been guilty of fraud. The words were clearly inserted to secure finality; both parties, as the judge said, agreed that nothing should invalidate the certificate, and he saw no reason why "grown-up men should not be allowed to contract on such terms." Notwithstanding this ruling, we cannot acquiesce in terms being used which would, if they had any legal effect, prevent a contractor from taking any action that he was honestly entitled to take in justice to himself. Such a course would be practically to debar a contractor from questioning or disputing any certificate that might be given, however suspicious it was. Certainly such a clause would not prevent litigation, for when proof of any collusion or confederacy was forthcoming between architect and his client it would not be difficult for the contractor to obtain a verdict in his favor. The finality of an architect's certificate, as we have seen in the first case mentioned, is insured whenever it has been given in a *bonâ fide* manner; it is a sufficiently binding document at all times, and does not need any verbiage of the sort we have quoted, unless, indeed, there is an intention to act unfairly. If fraud is suggested or insinuated, it has to be proved; therefore the architect does not insure greater finality by introducing words that can have no legal or binding effect. We have repeatedly seen clauses in contracts pitched in this key, of over-anxiety to be on the right side, even although the conditions officially sanctioned by the profession afford ample protection to the architect under clauses 18 and 20, the latter of which provides for arbitration in case of any question, dispute, or difference. The over-desire to insert binding words and phrases in contracts has, we contend, an effect which completely frustrates the object of the architect, for any builder who signs them naturally feels that little confidence is reposed in him, and he will not be inclined to be over-scrupulous in dealing with employers who have such a distrust of his motives. The evasive and dishonest contractor will not trouble about these clauses, for he is the least likely to be bound by them.

It may be of interest to mention that in the new conditions of contract just published by the authority of the Royal Victorian Institute of Architects, Australia, a stringent clause referring to certificates provides that if the proprietor refuse or neglect to pay the amount of any certificate given by the architect during the progress of the work for the period of so many days, after the same shall have been presented for payment the contractor may notify the proprietor that work will be suspended in forty-eight hours, and if the certificate is not paid within thirty days from the stoppage of works, the contract will be determined. This is a concession to the builders of the colony, who were expected to continue the work, notwithstanding the proprietor refused or neglected to pay. Another clause states that if, after the final certificate has been given, it is found that inferior materials or workmanship different from that described have been used, the contractor is to pay to the proprietor the costs and expenses which the latter has sustained. The clauses often found in contracts in relation to the final certificate do not always give the architect a satisfactory ground to proceed upon in case of defects discovered after the completion — a point on which the architect must often have painful experience. — *The Building News.*

SOCIETIES

ENGINEERING ASSOCIATION OF THE SOUTH.

AT the regular meeting of the Association in Nashville, Tenn., Prof. W. W. Carson, of Knoxville, Tenn., presented a paper entitled "A Plea for a More Rational Presentation of the Calculus." The beginner in the calculus finds the continuity of mathematical science broken and, instead of meeting the characteristic clearness of proof, he is surrounded by perplexity and darkness. Professor Carson investigates the causes of this state of affairs and proposes a remedy. He repudiates the doctrine of infinitely small quantities and would introduce "hypothetical" quantities, with the conception of which are logically deduced those equations gotten by the infinitesimal calculus.

The Association will next convene at the annual meeting in Nashville, November 9. Walter G. Kirkpatrick, *Secretary.*

THE SIXTH ANNUAL MEETING OF THE WESTERN NEW YORK CHAPTER OF THE AMERICAN INSTITUTE OF ARCHITECTS.

The Sixth Annual Meeting of the Western New York Chapter of the American Institute of Architects was held in Syracuse, N. Y., at the Yates Hotel, and called to order by F. H. Gouge, *President*, at 3.20 P. M., September 28, 1893.

After the roll call by Secretary Bickford, the annual address was delivered by the president, as follows:

Gentlemen of the Western New York Chapter:—

What can the Chapter do to arouse enthusiasm? This question has undoubtedly been often in your minds.

It was the main topic for discussion at the last meeting of the executive committee, and the secretary was instructed to mail to each member the circular letter which you have received with the call for this meeting, with the hope that each member would respond with full and frank suggestions and criticisms, as a guide to the committee in shaping the future management of the Chapter. And what is to be the future of the Chapter rests with you. The labor of officers or committees will be futile without the generous support of the members, and the members can render this support in no better way than by attending the conventions.

With the past history of the Chapter you are all familiar. It has done some good work, and not the least that it has accomplished has been in an indirect way.

In regard to what this Chapter has done, among other things we may well recall the efforts made to carry through the Licensing Bill. The work was long, earnest and persistent, and would have been successful had the Governor chosen his advisors with any idea of being advised with reference to the merits of the bill. But the work then done has not been lost.

And now what further can the Chapter do? That question I hope has been answered and outlined by many of you in your replies to the secretary's circular letter. But this certainly we can do: make a supreme effort to attend the conventions. We should not only look to the welfare of our own organization, but also to that of the A. I. A. At the present time the only means of access of new members to the Institute is through the Chapters, and there are many architects scattered throughout the towns and cities of Western New York who are very desirable men, and who may wish, and who should become members of the Institute. These men should be reached. This organization is the natural home for them and their sponsor for membership in the Institute. Do not misunderstand me in that I would belittle the importance of local Chapters. They are the very best life-blood of the Institute. They are of peculiar and great benefit to members in cities large enough to sustain them.

But I do believe that this organization reaches out to and covers, in a way that local organizations cannot, the smaller towns and cities which lie almost in touch of each other throughout the territory that we call Western New York.

The by-laws were also amended by giving to members the right to vote by proxy. It is to be hoped that this will not lessen in the minds of members the importance of attending the conventions and voting in person.

The profession to-day that is not fully organized and that cannot count upon a full and enthusiastic attendance at its conventions is lagging in the race for professional advancement. It is simply necessary to direct attention to the organizations of the so-called learned professions to prove if this is not true. Can your profession be an exception to the others? Does it call for any less skill? Does it call for any less learning and continuous study to fit its members for successful practice? Are its responsibilities any less? But rather, are not the requirements and responsibilities of our profession even greater, more varied and broader than these? All the more then as a means of mutual advancement and protection should we muster and concentrate our energies by a complete and thorough organization.

The report of the Executive Committee showed:

That there had been two meetings of the Executive Committee since the last annual meeting at Buffalo. Two applications for membership in the Chapter had been received and endorsed by the Executive Committee. Quite a number of persons had been recommended for admission to the Chapter, and no members had been dropped from the roll during the past year. Although they stated with much regret that death had during the past year removed one of their number, Mr. J.P. Johnston, of Ogdensburgh.

The balloting for the election of officers resulted in the re-election of all the present officers of the Chapter, as follows: *President*, F. H. Gouge, Utica, N. Y.; *Secretary*, H. H. Bickford, Elmira, N. Y.; *Treasurer*, Otto Block, Rochester, N. Y.; *First Vice-President*, W. S. Wicks, Buffalo, N. Y.; *Second Vice-President*, O. K. Foote, Rochester, N. Y.; *Executive Committee* to act with the President, Secretary and Treasurer, J. H. Pierce, Elmira, N. Y.; W. W. Carlin, Buffalo, N. Y.

In the general discussion following regarding the future prospects of the Chapter a very interesting programme was mapped out for the next annual convention, and a determination was shown to make the future conventions so interesting and profitable that no member could afford to be absent. It was decided to have an exhibition of drawings submitted by members of the Chapter, and the Chair was empowered to appoint a committee to take charge of the exhibition of drawings; such committee to be made up of resident members in the city where the Executive Committee decide to hold the next annual meeting.

The Chair was also empowered to appoint a committee of one to take charge of and provide for discussion of subjects of professional interest, and for the furnishing and reading of original papers on professional topics; and Prof. C. Francis Osborne, of Cornell University, was appointed as such committee of one.

The subject of holding an annual banquet was then discussed, and and the unanimous opinion seemed to prevail that a banquet should take place after each convention, the expense of which should be borne by the members accepting invitations to attend, instead of by the architects in the city where the convention is held.

Those of the members who remained during the evening in the city were very pleasantly entertained by Mr. Charles S. Colton of Syracuse. H. H. Bickford, *Sec'y.*

RHODE ISLAND CHAPTER, AMERICAN INSTITUTE OF ARCHITECTS.

The annual meeting of the Rhode Island Chapter, American Institute of Architects, was held October 8, in one of Tillinghast's dining-rooms. Supper was served at seven.

The officers chosen for the ensuing year are, *President*, Edward I. Nickerson; *Vice-president*, Alfred Stone; *Secretary*, Franklin J. Sawtelle; *Treasurer*, James Fludder, Newport; *Executive Committee*, Messrs. Angell, Willson, Field and H. Hoppin; *Committee on Admissions*, Messrs. Carpenter, Angell and Shaw, Jr.

Prizes were voted for drawings of colonial work in this State for the months of May, June, July and September. Arrangements will soon be made to continue the collection of these fast vanishing bits of local classic work. F. J. Sawtelle, *Secretary.*

THE T-SQUARE CLUB OF PHILADELPHIA.

A meeting of the T-Square Club of Philadelphia was held Wednesday evening, October 18, at their new quarters in the building of the School of Industrial Art, where through the courtesy of Prof. L. W. Miller, they have been given the use of a large and commodious room. The T-Square Club will assume direction of the courses of the Architectural Department of the School, and a series of five lectures will be given each year by members of the Club.

The subject for competition consisted of the exhibition of sketches made by the members of the Club during the past year. First prize being awarded to Charles Z. Clauder; William L. Price receiving second prize and Albert Kelsey honorable mention.

The officers for the ensuing year were elected: Percy Ash being chosen *President; Guy* King, *Vice-President;* Geo. B. Page, *Secretary*, and D. K. Boyd re-elected *Treasurer. Executive Committee*: Wilson Eyre, Jr., John Stewardson and Albert Kelsey.

A cover for the Sketch-book of the Club was announced as the subject for the competition at the next meeting.

Yours truly, Geo. Bispham Page, *Sec'y.*

The Solferino Monument. — The monument which has been erected upon the battle-field of Solferino is one of the largest, if not the largest, of its kind in all Europe. It consists of a tower seventy-four metres high, surmounted by an electric lamp, and rises in seven stories, each representing a campaign in the struggle for the independence of Italy. Each separate story contains all the names of the generals and other officers, as well as the men who fought in that campaign. No fewer than 700,000 names are thus inscribed on the inner walls of the monument. On the ground floor are the busts and portraits of all the leading generals, and the chief ornament in the centre of the ground floor is the colossal monument in bronze of Victor Emmanuel by the Venetian sculptor Dal Zotto. The tower stands in grounds beautifully laid out, and constitutes a magnificent memorial of Italian unity. Beneath the structure repose 2,000 skulls and other remains of soldiers of the three nations who fell on the field of Solferino. — *New York Evening Post.*

ILLUSTRATIONS

[*Contributors of drawings are requested to send also plans and a full and adequate description of the buildings, including a statement of cost.*]

SOUTH SIDE OF THE COURT OF HONOR AND THE ADMINISTRATION BUILDING, WORLD'S FAIR, CHICAGO, ILL.

[Gelatine Print issued with the International and Imperial Editions only.]

HOUSE FOR D. B. WESSON, ESQ., SPRINGFIELD, MASS. MR. BRUCE PRICE, ARCHITECT, NEW YORK, N. Y.

THE red Maine granite composing all the walls gives a pink effect, especially noticeable in the sunlight. The steep roofs will be covered with a glossy red slate quarried in western New York. In its general treatment the architecture is a slight departure from the French château fashion. Instead of smooth finished blocks used in the château structures the faces of the stones will be in ashlar. Verandas and balconies are built on every side, while the dormer-windows and the towers on each side of the east entrance are features that stamp the structure with individuality. The towers will end in bronze-colored copper caps. The building occupies a space 140′ x 96′ in its extreme dimensions, and will be 60 feet high. The main structure is 75′ x 57′, and there is an L on the north side about 40 feet square devoted to the domestic work department. The main entrance on the east side is through a stoop with stone pillars on each side and a carved stone panel overhead. Two high and narrow windows will light the vestibule, with its floor of marble mosaic. A hall 20 feet wide runs through to the west entrance, but it is partly cut off in the centre by an ornamental screen of wood, concealing the staircase. The first steps are in line with the centre of the hall, but the stairs turn abruptly and lead to a hall platform. This ends in a semicircle on the west side, and is open to the skylight above. Five colored-glass windows light it from the sides. This hall room is fashioned something after a mezzanine, and will contain tapestries and other works of art, which can be suitably displayed there.

There will be a large fireplace at the right of the hall, and the woodwork will be elaborately finished with hanging beams. At the left of the entrance is the reception-room. Each opens into a tower corner 15 feet in diameter. Back of the reception-room is the library, which has a square bay-window. The dining-room, back of the sitting-room, will be provided with an elaborate buffet and has a bay-window. Between the dining-room and library will be the "den." All four of the main rooms on the lower floor are 12 feet in the clear, and are provided with fireplaces. There is a hall 11 feet wide running north and south through the centre of the building, and leading to the domestic department in the north end. Upstairs are six chambers besides bath-rooms and ample closets. The verandas will be features of the structure. On the west side is a piazza 75 feet long, 17 feet wide, with a marble mosaic floor. Three polished granite columns support the centre of the roof, while there are single granite piers in the corners. The south side veranda is 14 feet wide and has also three polished granite pillars. This has the carriage platform, but the original idea of building a *porte cochère* was abandoned. The structure will be warmed by the hot-water system supplied from a plant in the barn. It will be equipped for electric-lighting and provided with an elevator.

COTTAGE FOR MRS. S. K. HADDING, BAR HARBOR, ME. MR. JAMES BROWN LORD, ARCHITECT, NEW YORK, N. Y.

THE GOLDEN GATE OF THE TRANSPORTATION BUILDING, WORLD'S FAIR, CHICAGO, ILL. MESSRS. ADLER & SULLIVAN, ARCHITECTS, CHICAGO, ILL.

A DOORWAY AT BOURGES, FRANCE.

THE MANUFACTURES AND LIBERAL ARTS BUILDING OF THE MID-WINTER FAIR, SAN FRANCISCO, CAL. MR. A. PAGE BROWN, ARCHITECT, SAN FRANCISCO, CAL.

THE MECHANICAL ARTS BUILDING OF THE MID-WINTER FAIR, SAN FRANCISCO, CAL. MR. EDWARD R. SWAIN, ARCHITECT, SAN FRANCISCO, CAL.

[Additional Illustrations in the International Edition.]

THE ROMAN BATH, NIMES, FRANCE.

[Copper-plate Etching.]

WHEN you ascend the main street of Nîmes, you leave on your left the arena, on the right the Maison Carrée, and still ascending, you come upon an esplanade planted with fine trees, and before you a steep hill, still surmounted by an old Roman tower of unknown destination, which possibly might have been used for some kind of an aerial telegraph. At your feet, beneath the level of the ground, a fine fountain discharges its water into sumptuous basins, surrounded by veritable porticos, the bases of whose columns are below the level of the water. Then on the left and in front of you lies a great open basin, from which the water is discharged, and upon the left again the enormous ruins of an antique building, the restoration of which has never been made, and which must contain in reserve some pleasant surprises for the artist who shall undertake the task. At the right of the spring and level with the ground are numberless bases of columns, which bear witness that porticos surrounded the entire space, and transformed its enormous plateau into a majestic edifice which it is difficult to imagine.

THE MERCHANT TAILORS' BUILDING, WORLD'S FAIR GROUNDS, CHICAGO, ILL. MR. C. B. ATWOOD, ARCHITECT, CHICAGO, ILL.

[Gelatine Print.]

DETAIL OF THE PERISTYLE, WORLD'S FAIR GROUNDS, CHICAGO, ILL. MR. C. B. ATWOOD, ARCHITECT, CHICAGO, ILL.

[Gelatine Print.]

RAWDON HOUSE, HODDESDON, A. D. 1622.

HIGH SCHOOL FOR GIRLS, LINCOLN, ENG. MR. W. WATKINS, F. R. I. B. A., ARCHITECT, LINCOLN, ENG.

THE foundation-stone of this school was laid by the Mayor of Lincoln, in the presence of the Lord Bishop of the Diocese and a large company of citizens, last April, and it is now being erected for the Governors of Christ's Hospital Charity, under the scheme of the Charity Commissioners. It is on the picturesque site of the old Temple Gardens, which is situate on the side of the hill just beneath the minster and abuts on to the quaint Greestone stairs which lead up to it from the Lindum Road. There is a rapid fall in the ground on which the school is built — nearly 20 feet in the depth of the building — and this, together with the natural formation of the city into upper and lower towns, has had considerable influence on the planning of the building. The Governors recommended two instead of one entrance for the scholars, the main entrance being in the lower ground-floor in the south of the front facing Lindum Road for the use of those residing in the lower part of the city, and the other is placed on the upper general ground-floor level for the convenience of those residing in the upper town. The building is planned on the "central hall" or "hall passage" system, and is arranged to accommodate 250 girls. It comprises a central hall 52 feet by 26 feet (exclusive of the corridor under the gallery) and four class-rooms 22 feet by 20 feet and 20 feet by 20 feet each on the ground-floor and four similar class-rooms over them, the latter being approached by means of a staircase commencing in the central hall and leading to the gallery. These class-rooms are exclusive of one large and two small music-rooms. All the doors open into the central hall. Especial attention has been given to the arrangement of the desks and to lighting, the light in all cases being admitted at the left hand of the pupils. There is a residence for the lady principal, and accommodation for dining at a small fee for those girls who reside at a distance from the school; the pupils' dining-room, kitchen, scullery and pantries and the lady-principal's dining-room all being on the lower ground-floor right and left of the main entrance. The school is built of the red bricks of the neighborhood, with red terra-cotta dressings, and green slates are being used for the roofs.

PRAGUE. AFTER A DRAWING BY SAMUEL PROUT.

COMMUNICATIONS

[*The editors cannot pay attention to demands of correspondents who forget to give their names and addresses as guaranty of good faith; nor do they hold themselves responsible for opinions expressed by their correspondents.*]

BARBARISM AND THE STAINS OF TIME.

October 2, 1893.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Will you grant me a short space to call the attention of architects to a barbarism I saw perpetrated recently in New York.

Close to the Elevated Railway Station at Park Place there stands a large office-building, belonging, I believe, to an insurance company. During the past twenty years or so the marble had become weather-stained with the most charming tints of ochreous yellow imaginable; tones and hues that Ruskin would have written a book upon and J. M. W. Turner would have painted a picture from. Indeed it would have taxed the talent of a most skilled colorist to have done justice to the delicacy and beauty with which nature had tinted the building. When I saw it I remarked to an artist friend who was with me that probably Alma-Tadema was one of the few who could render full justice to it.

Yet there was a scaffolding on the face of this building and men at work diligently scraping the marble down to its original cold whiteness, making it rather resemble something got up for a cemetery than a building in harmony with its surroundings.

I should have supposed that by this time enough people had been to Europe and been gratified by the beauty of buildings touched by the softening hand of time and that enough of art education had been promulgated in this country, to have prevented an industrious destruction of real beauty.

I suppose, however, a good deal depends on the way things are looked at by different people. I looked at that stained marble with the eye of a practical scene-painter and was enraptured; the person who had it scraped down must have seen dirt with the eye of a washerwoman. SYDNEY CHIDLEY.

ENGLISH *VS.* GERMAN PORTLAND CEMENTS.

NEW YORK, N. Y., October 30, 1893.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—Referring to Mr. F. W. Chandler's letter giving extracts from M. Candlot's book on cements and hydraulic lime to the effect "that the manufacture of cement in England has remained the same as twenty years ago," and your editorial which concludes with the paragraph, "the indescribable stuff that builders use to comply with a specification which calls for Portland cement without mentioning any particular brand, usually comes out of a barrel with an English name on it."

We feel that the *American Architect* and your correspondent regard Engltsh cement through Continental spectacles and are unaware of certain conditions.

In the last decade English manufacturers have paid great attention to fine grinding of cement, as more than ten years ago fifteen per cent to twenty per cent residue on a No. 50 sieve was deemed suitable for all work, but the requirements of English engineers and foreign buyers demanded finer material and now the ordinary production is two per cent to five per cent residue on a No. 50 sieve. A chemist is also retained at the works for analytical purposes, and the manufacture of cement is by no means conducted in an indifferent or happy-go-lucky way. Many makers also employ tarred or waterproof paper for lining the barrel, and this feature the writer was perhaps the first to require, as it prevents the cement from being affected by dampness during transportation.

English cement manufacturers meet with unfair competition because some American, Belgian and German cement-makers or dealers, label their barrels with an English name, and the following extract from letter of a New York selling-agent for an American cement, is self-explanatory:

"It (American cement) is packed in foreign barrels which we purchase in the market, and receiving it every day from our factory in bulk can be no damage to goods which often occurs on a sea voyage across the Atlantic. Where there is a strong prejudice against an American article we overcome it by using a foreign label either English or German (which we enclose) and which you can use."

We think, therefore, that your statement, "other barrels exhibited traces of cement of a certain color adhering to the inside while the mass of the contents was of a different color indicating that the barrels had been emptied of their original contents and refilled with something else the properties of which were unknown," must refer to such indescribable stuff.

Specifications were recently handed us, made by architects of national reputation, that called for two certain brands of Portland cement, one of high class and the other of very coarse and inferior quality, hence we consider it our duty to point out that a loophole was left to a contractor to employ inferior material.

Yours truly, FLEMING CEMENT & BRICK COMPANY,
HOWARD FLEMING, *President.*

[THE statement that false labels are used by *some* dealers we know to be unpleasantly true. We use only American spectacles when trying to ascertain the facts in the case, and are not afflicted with Anglophobia.—EDS. AMERICAN ARCHITECT.]

NEW YORK, N. Y., October 31, 1893.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—Permit us to add something to what you have already stated in your comments of October 14 and 28, on a certain article in the *Builder*, as to why architects and engineers in this country prefer to use the best German rather than the best English Portland cements.

Any one at all familiar with the development of the trade in Portland cement in this country during the past fifteen years must recognize the absolute correctness of the reasons given by you for the existence of that preference. It is surprising that any one should attempt to refute them.

The English cements were the first to enter this market, and were already well established before anything was known here of German cements, and had they been at all mindful of the repeated warnings from this side, they might have retained that advantage.

The German manufacturers did not attempt to capture the trade in this country by low prices, but realizing that their best recommendation must be a high standard of quality, and the delivery of the cement to the consumer in the best possible condition, they bent all their energies in that direction. The wisdom of that course was very quickly demonstrated, as the consumer soon found, by practical results, that even at a higher price, the best German cements were more economical and eminently more reliable: the result being that, with the most careful users of cement, those brands rapidly supplanted the best English cements.

The English makers, when informed of the situation, were incredulous, and refused to believe that any cement could be better than theirs, but when finally brought face to face with the facts, admitted, what was unquestionably true, that they could not afford to make a better article, as the trade in England did not demand it, and would not pay for it.

What was true of the great superiority of the best German brands a dozen years ago, is equally true to-day. In not a single branch of the cement-making, has the English maker kept pace with the German.

We have a letter before us dated 27th of May last from a correspondent in London, a large exporter of Portland cement, and intimately acquainted with the English manufactures, in which he says: "While we fully endorse your statement as regards the stolidness of the average English manufacturers towards ignoring the various points of improvement necessary to put their cements in competition with German makes, we would submit that we have done something to raise the standard of English cements. There is a further point, viz, that whatever indifference English manufacturers may have shown in the past, the long depression in this trade, has undoubtedly shown the majority of London makers that they cannot expect to hold their own unless they put themselves in a position to supply cements of a standard suitable for your market. We take it that provided any English manufacturer does put on your market cement to compete in packing and fineness with the German cements, it would be taken hold of with the result of bringing the cement to the front."

Within the past month, one of the largest London manufacturers whose cement at one time was the favorite brand in this country, but fell from that high position because of his indifference to our demands for better quality, writing to an importer here, said: "My cement will now be found quite equal to the best German brands."

In the year 1892, Mr. George S. Green, Jr., Chief Eng. Dept. of Docks, this city, in answer to the inquiry of an architect, said, "We found Alsen's manufacture to be superior to the English Portland cement." Certainly in the year 1893, the emphasis would be even stronger on the superiority of Alsen's brand over any English cement made.

The preference for German cements has not been confined to the United States, but exists in Canada and Australia, countries that one would expect naturally to look to English makers for their supplies. The largest work, using Portland cement that has been executed in Canada in recent years, was the Princess Louise Embankment and Graving Dock at Quebec. The Commissioners gave the preference to Alsen's cement at a higher price than the best English cement was offered at, and it was used throughout the work.

The reasons that have impelled careful users of cement to prefer the German brands are so well known in England to be all in the direction of obtaining the highest standard of quality, regardless of price, within reasonable limits, that there can be no excuse for the *Builder* making the contrary statement in endeavoring to account for the English manufacturers' loss of trade.

It is eminently proper that the best German makers should be accorded full credit for the exercise of exceeding care in all the departments of manufacture necessary to insure that uniformity in quality that is most essential in Portland cement, nor have they been willing to let well enough alone, but have continually raised their standard and endeavored to work up to it. It has been no small factor that the German engineers have so ably seconded the motives of the manufacturers by recognizing the greater value of the better article.

The position taken by you, therefore, in your editorials, does but justice to the best German makers, and cannot be detrimental to the interests of the English makers if it helps to show them that quality, not price, is the best recommendation in this market.

In the meantime, architects and engineers are justified in insisting that only the best German cements shall be used in their work, and insuring that by making it mandatory in their specifications.

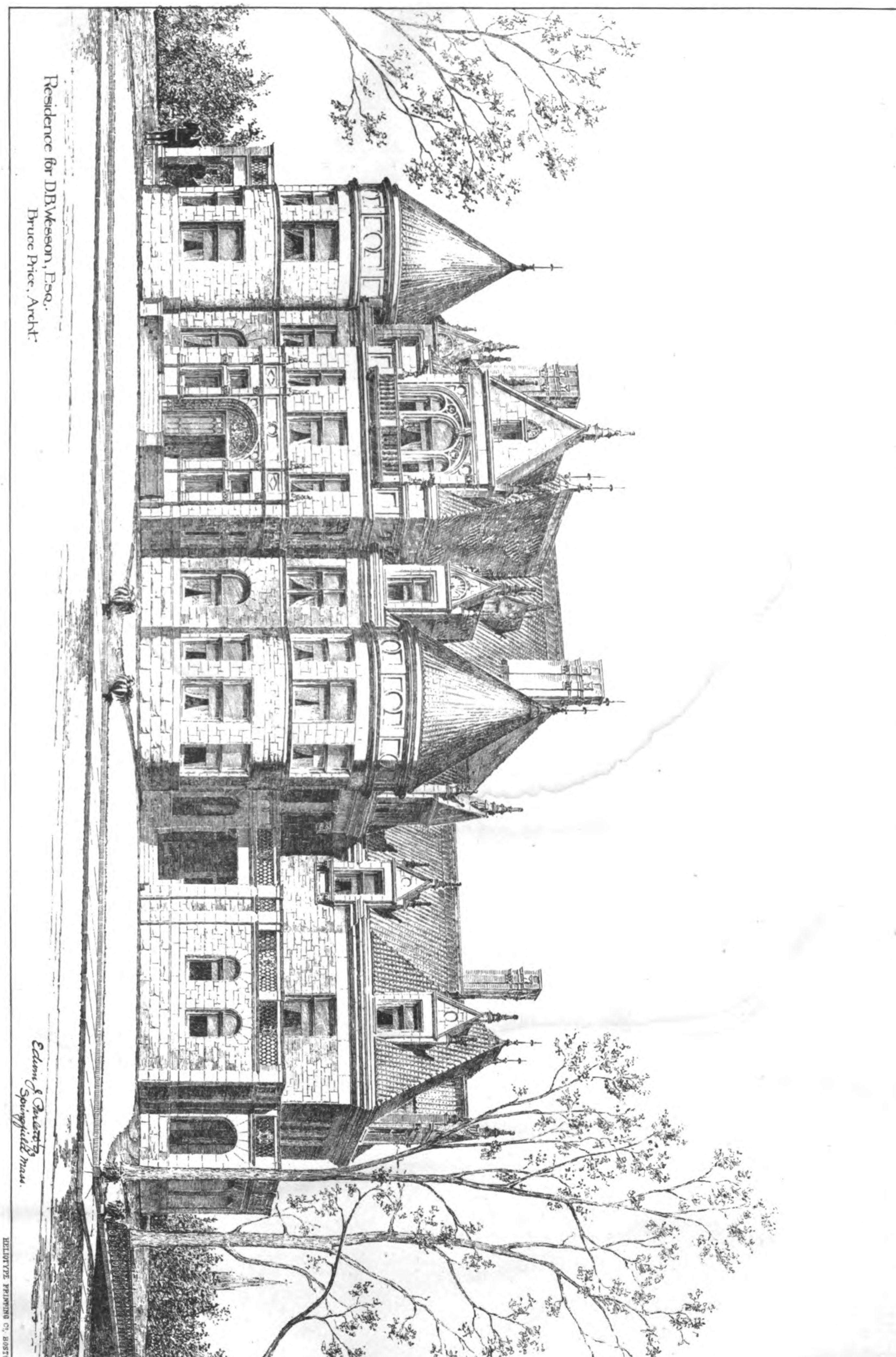
SINCLAIR & BABSON.

NOTES AND CLIPPINGS

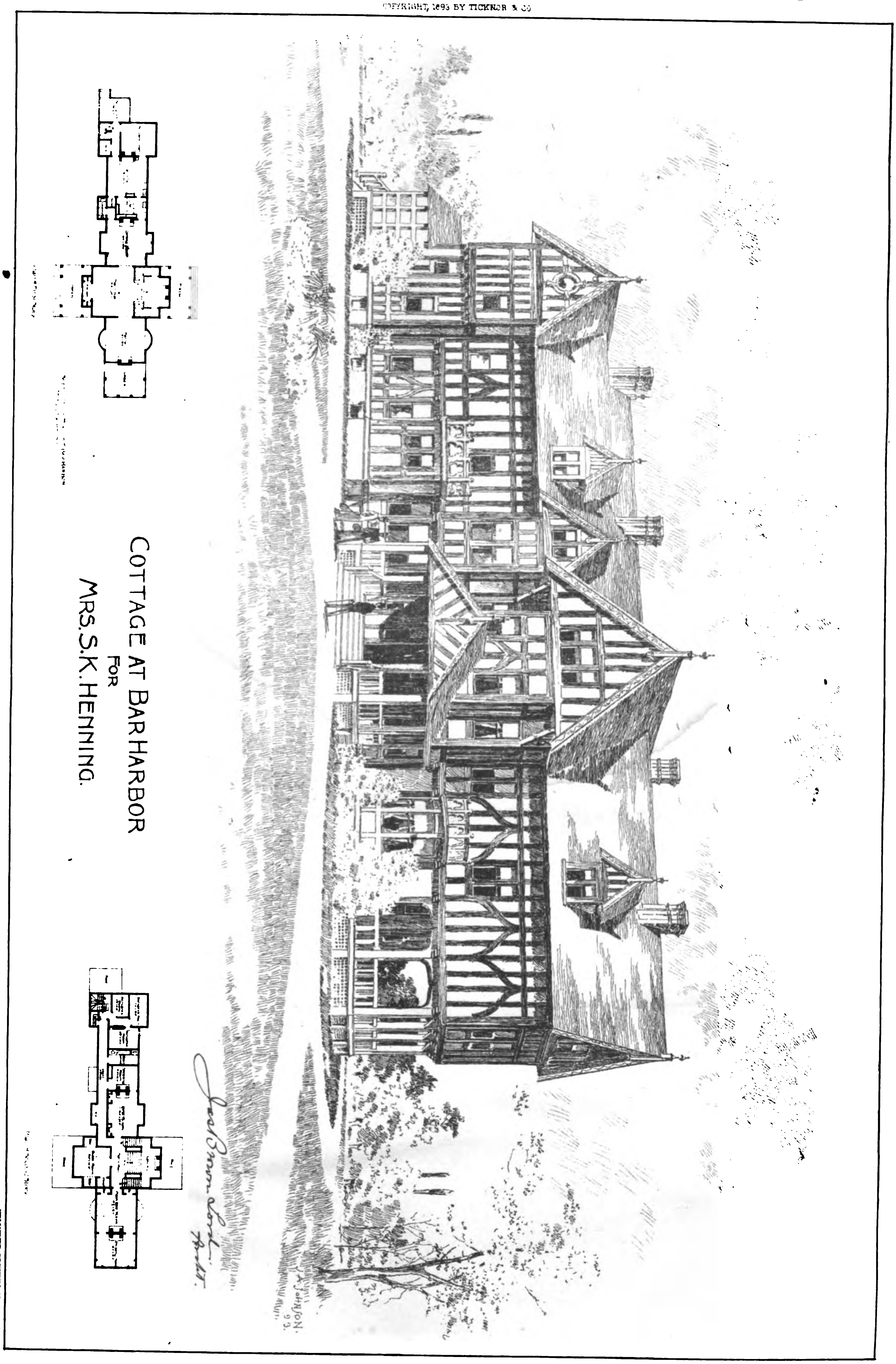
A SCULPTOR GETS DAMAGES FOR NOT MAKING A STATUE.—In the case of W. C. Noble against John McCausele and others before the Massachusetts Supreme Court, Judge Morton sitting, an action to recover damages for failure to carry out a contract under which the defendants agreed to let the plaintiff make a statue for the Poet Burns Monument Association for Roger Williams Park at Providence, R. I., the jury after two hours' deliberation, reported a verdict for Noble, the sculptor, for $7,325.—*Exchange.*

THE ALLEGED DA VINCI FRESCOES AT MILAN.—The well-informed art critic of The Westminister *Gazette* denies categorically the truth of a statement widely published in France, to the effect that magnificent frescoes by Lionardo da Vinci have been discovered in Milan on the demolition of certain old buildings. "Having set inquiries on foot by one who would probably hear at once of any such discovery, I am informed that neither he nor the Academy of Fine Arts, to which he also applied, can hear anything of the matter, nor do they believe a word of it."

S. J. PARKHILL & Co., Printers, Boston, U. S. A.



Residence for D. B. Wesson, Esq.
Bruce Price, Archt.



COTTAGE AT BAR HARBOR FOR MRS. S. K. HENNING.

AMERICAN ARCHITECT AND BU

THE GOLDEN GATE OF THE

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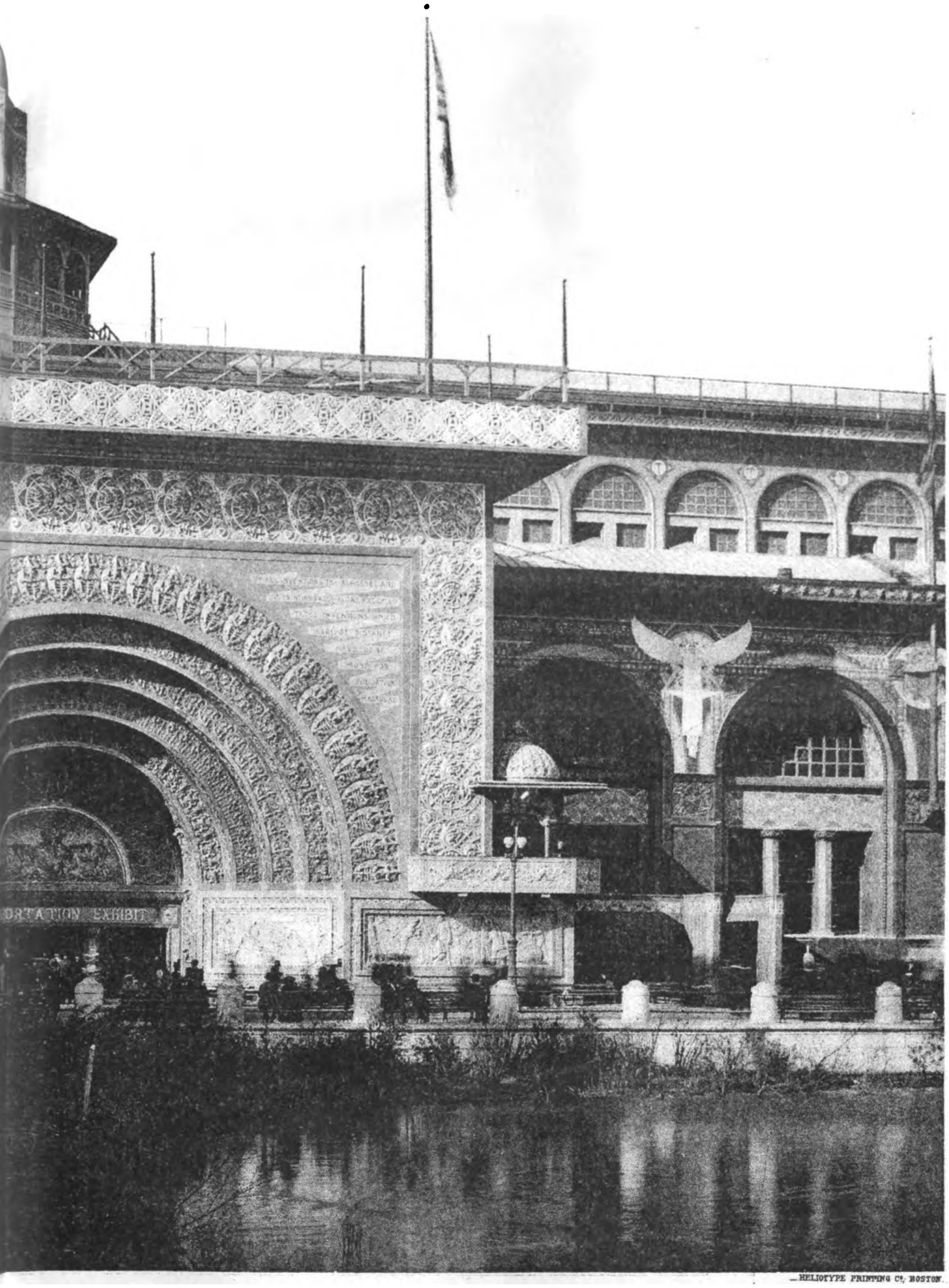
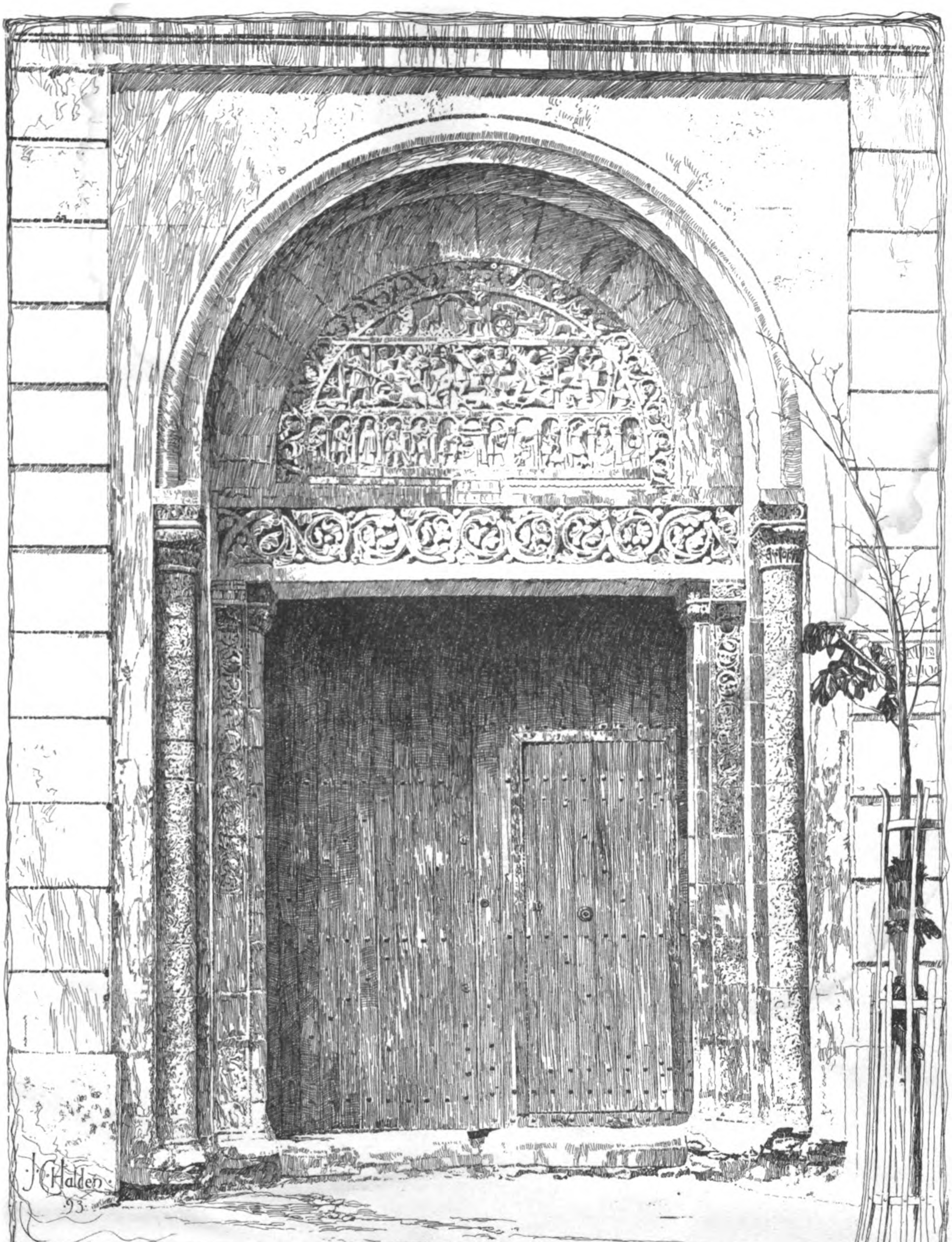


E TRANSPORTATION BUILDING.

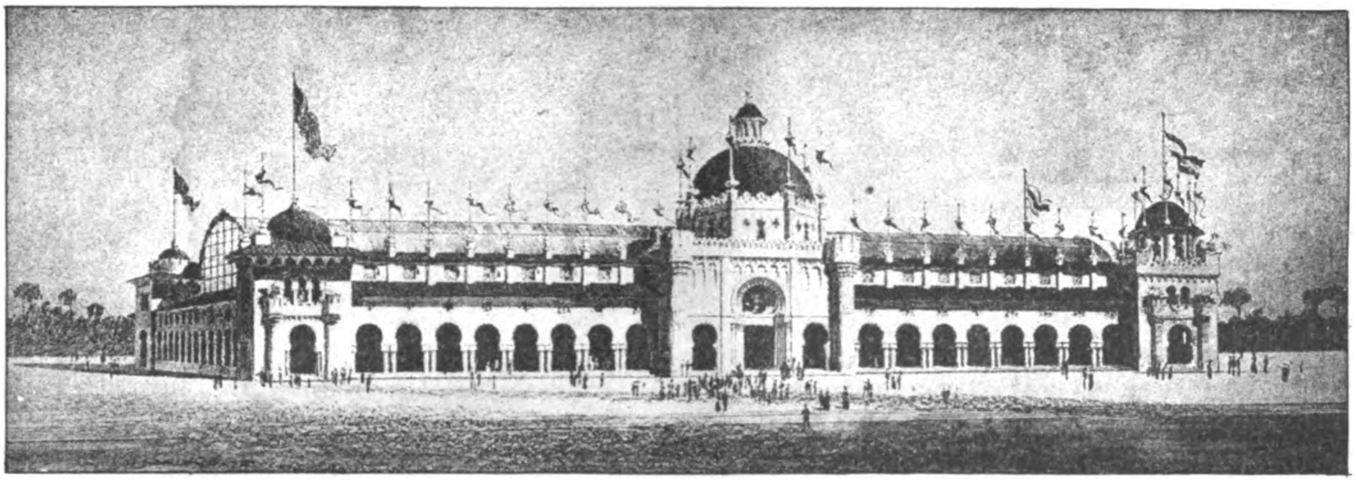
XHIBITION, CHICAGO, ILL.

LIVAN, Architects.

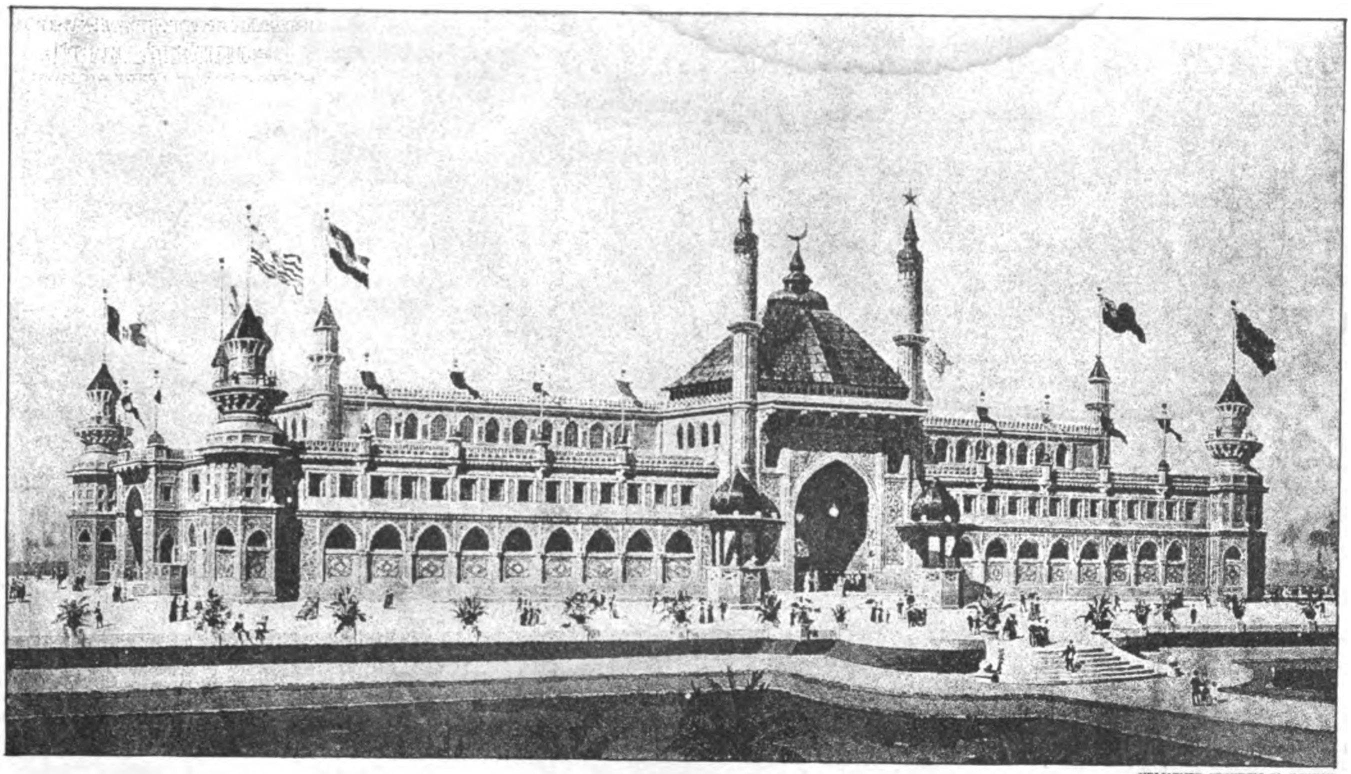


HELIOTYPE PRINTING Co. BOSTON.

An · Old · Doorway · Bourges · France



THE MANUFACTURES AND LIBERAL ARTS BUILDING: A. PAGE BROWN, Architect.



THE MECHANICAL ARTS BUILDING · EDWARD R. SWAIN, Architect.

BUILDINGS FOR THE MID-WINTER FAIR, SAN FRANCISCO, CAL.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XLII. No. 933.

Entered at the Post-Office at Boston as second-class matter.

NOVEMBER 11, 1893.

CONTENTS

AN important decision was rendered in New York a few days ago, defining the rights of owners of property abutting on streets in process of improvement. Mr. Albert Tilt owns a four-story frame house, used as a hotel, on the Macomb's Dam road, near the bridge across the Harlem River. The old bridge at that point is being replaced by another one, at a much higher level, so that it is necessary to raise the grade of the approaches by an amount varying from ten to thirty feet. The contractor for the work proceeded with his grading operations without reference to the convenience of the neighbors, but when Mr. Tilt saw rock, gravel and loam being filled-in against his house, he objected. The contractor coolly replied that if he did not like the dirt against his building, he had better build a retaining-wall, as otherwise the grading would bury the front of the building as high as the second story windows. Mr. Tilt suggested that the contractor ought to build the retaining-wall, if it was necessary to prevent the filling material from encroaching on private property, but the contractor declined to do anything of the kind, and Mr. Tilt applied for an injunction to restrain the contractor from doing any more filling in such a way as to damage his property. At the hearing on the injunction, the judge expressed the opinion that the city was not strictly liable for the trespass of the contractor on private property, but that, in carrying out a public improvement, it ought to provide for having the work done in such a way as to prevent unnecessary encroachment on the abutting premises, and that therefore the city should build the retaining-wall required, even though the cost of the improvement would be thereby increased.

THE joint exhibition of the Architectural League and the Sculpture Society promises to be one of the most notable artistic events of the year in New York. Not only will each portion of the exhibition enhance the interest and value of the other, but the association of the two is a sort of announcement of betrothal of the two arts represented, which should have important consequences. Few persons in the profession can realize, without looking back in recollection to the days before the League existed, how much it has done to establish architecture in this country as one of the fine arts, and to promote the connection between it and the other arts; and the introduction of a complete display of sculpture into the exhibition rooms, in place of the few, though beautiful examples of sculptural work which have usually been shown in the bric-à-brac rooms, is a long step in advance in the path which the League has followed so steadily and successfully. We hope that our readers will remember that the exhibition begins December 18, and continues until January 9, and that it has always been worth a journey of a good many hundred miles to see, and will be worth it this year more than ever.

WE are quite inclined, after all the discussion on the subject of English and German Portland cements, to come to the rescue of the English manufacturers, who have been, as we think, rather more hardly treated by our correspondents than they deserve. Our original point, that the *Builder* was very much mistaken in thinking that English Portland cements were too good for the American market, and that its advice to the English manufacturers, to debase the quality of their product, in order to extend its sale here, was about the worst that could be given, has certainly been sustained; but the fact that English cements in general are very commonly regarded by our architects and engineers as inferior in quality to the German does not prove that some English brands are not now made of very excellent quality. Notwithstanding the opinion of Candlot, and of certain other authorities who have been mentioned, no one can have followed the current history of the cement manufacture, as shown in the foreign technical journals, without observing that, in recent years, some of the English manufacturers have endeavored earnestly, and, no doubt, successfully, to produce a material which should rival the German cement in fineness, uniformity and scientific preparation. Mr. Fleming himself, although he modestly refrains from saying so, has, we are convinced, had a considerable part in promoting this improvement, as he certainly has in securing improved packing, and we are quite ready to believe that he can tell where English Portland cement of the very highest class can be obtained; but early impressions are very lasting, particularly among architects who have an almost infinite variety of materials to deal with, and we think it likely that he has found his efforts hampered to no small extent by the fact that while the English manufacturers threw away their American market by doing exactly what the *Builder* advises them to do, with the idea that the Americans did not know bad cement from good, the Germans, by sending us the best they had, and, for a time, at least, only the best, gained at the outset friends and reputation which will last them for many years to come. Ultimately, no doubt, the first-class brands will be impartially recognized here, whether they come from England, Germany or Pennsylvania, and the more rigidly architects and engineers reject everything that is not of the highest quality, the more encouragement they will give to the manufacturers and dealers who are trying to improve this most important material.

AS for the nice man of whom Mr. Fleming speaks, who "overcomes" the prejudice against his American goods by sending to the retailers forged English or German labels, to be pasted on the heads of the barrels, we would as individuals coöperate with all honest dealers, and lovers of fair play in general, in having him shown in his true colors. Few things are more exasperating to an architect than attempts to palm off vile counterfeits upon him as genuine goods, yet hardly anything is more common in building practice in this country. Judging from the multitudes of warnings to "Beware of imitations," or "Éviter les contrefaçons," in English and French advertisements of building appliances, the case is much the same abroad, but the trick of pasting a forged foreign label on a barrel of inferior cement is so difficult to detect, and so injurious to the reputation of the manufacturer whose name is stolen, that decent members of the building brotherhood ought to combine against it. We are not sure that there is any trade-mark treaty between the United States and foreign countries, such as exists between European nations, which makes it a penal offence for a person in one country to forge or imitate a trade-mark registered in another. If not, one of the most effectual methods of protecting ourselves and the better class of manufacturers against fraud is beyond our reach, but it might perhaps be possible to establish a sort of "counterfeit detector," describing fictitious cement or other labels, as the

publications used by banks describe new counterfeit bills as fast as they appear. The persons who live by stealing other people's reputation are not usually very intelligent or very careful, and often make curious slips in their forgeries, like the Japanese dealer, who exposed bottles in his shop, labelled "Fine Glasgow Wine"; and even where the variation from the original was not so glaring as to be immediately apparent, close examination would generally detect discrepancies, which could be pointed out to those interested.

THE Massachusetts Legislature passed an act last winter, authorizing the inhabitants of Boston, by vote, to accept a plan, prepared by a committee of the Legislature, for a "rapid-transit" railroad, consisting essentially of an elevated line, running through private property, nearly parallel with Washington Street and about midway between that and Tremont Street. The Legislative committee spent a great deal of time and trouble on this scheme, which, like anything discussed in such a committee, was the result of innumerable compromises between conflicting interests. The committee estimated the cost of carrying out its plan at nine million dollars, which would be quite enough for a line four miles long, but this estimate was confessedly a hasty one, the time for preparing it having been limited. Since the adjournment of the Legislature, the City Engineer of Boston, under the direction of the Mayor, has laid out the route proposed by the Legislature with great minuteness, and has made estimates of the cost, which, with a very moderate allowance for consequential damages to private property, amounts to seventeen million dollars, and there are contingent expenses, which would probably bring the total to twenty millions. Of course the idea of spending twenty million dollars on a railway four miles long is preposterous, and the Mayor took the rather unusual step of announcing publicly that he, as a citizen, would vote against the acceptance of the act, and that he hoped his fellow-citizens would do the same, which a majority of them did on Tuesday.

INDEPENDENT of the folly of building a rapid-transit line in Boston at a cost per mile about eight times as great as that of the New York Elevated road, it is by no means certain that the line projected by the Legislative committee would be the best possible. The idea of the committee, like that of a great many other people, seems to have been to look on the map, see what streets were most crowded, and then draw the line of the railway parallel to those streets, and as near them as possible, as if there were some mysterious advantage to the passengers on the rapid-transit line in being drawn along at the rate of thirty miles an hour over a route from which they could look into Washington Street. This notion completely ignores the fact that on a rapid-transit line it would be impracticable to have stations within a quarter of a mile of each other, and it would be better to have them half a mile apart, so, if stations were placed, say, at or near the junctions of Boylston, Winter and Court Streets with Washington Street, which is as near together as they could be placed on a line parallel with Washington Street, these stations could be reached just as well, probably at less expense, and with infinitely greater convenience to the public, by a road running from the Boylston Street station eastward to the Albany and Old Colony stations on Kneeland Street, thence around through a cheap neighborhood to the New York & New England station, back near the line of Summer Street to the station on the corner of Washington and Winter Streets; thence under Park Street to Bowdoin Square and back to the corner of Washington and Court Streets. Although the actual railway on this line would be much longer than by a straight route between Washington and Tremont Streets, the extra cost of construction of the railway itself would be much more than offset by the saving in land damages; and, keeping the distance between stations at about a quarter of a mile, the line would have the inestimable advantage of transporting passengers to the Albany, Old Colony and New England stations, and to a connection with the Cambridge cars at Bowdoin Square, as well as to all the points on Washington Street that it would be practicable to reach with a direct line. To the objection that the serpentine course, even if more convenient, and not more expensive, than the other, would take longer to traverse, it may be replied that the total time required in going over it from Boylston to Court Street would probably not be more than seven minutes, exclusive of the stops, and the three minutes necessary for the three extra stops would be nothing in comparison with the advantages secured. Of course, it is understood that this is simply suggested to show the vast difference, in the conditions, between a surface road, with slow-moving cars, taking and leaving passengers all along the route, and an elevated or sunk line, with cars moving at the rate of half a mile a minute, and with the minimum distance between stations limited to a quarter or a third of a mile. With the former, a saving of distance means a great saving of time, and convenience must to a certain extent be sacrificed to save time; while, with a rapid-transit road, distance is practically nothing, in comparison with convenience, and an increase in distance often promotes not only convenience but economy.

A RECENT letter to the *Nation*, from Mr. C. Meriwether, gives an interesting illustration of the process which is converting North and South Carolina into a desert, in the same way that a large part of Virginia has already been depopulated, and that Kansas is approaching ruin. Every one knows that the Carolinas consist of a low sandy strip along the coast, rising to chains of hills, or even mountains, inland. The fertile part of both states, if we leave out the rice-swamps and Sea Islands of South Carolina, is chiefly found on the slopes of the hills. On these slopes cotton was once raised in large quantities, and is still extensively cultivated, but the acreage is diminishing, and it will not be long before the hill country will cease to be of any agricultural value. In its natural condition, the hill region is covered with forest, and, in order to bring it under cultivation, the trees are cleared away. This is done in the usual reckless manner, with axe and fire, leaving the ground bare. After the stumps have been pulled out, or have rotted away, the ground is ploughed, and, with incredible folly, the furrows are generally ploughed straight down the hill. The next rain forms a brook in every furrow, which carries with it some of the precious virgin loam, and deposits it in the bed of some stream in the valley, and the process is repeated with every rain, until all the arable soil from the slope, the accumulation of many thousand years, is washed into the brooks and rivers, which it chokes up, converting the meadows into pools and marshes, and leaving the hill farms barren. Mr. Meriwether says that fields which, fifteen years ago, produced a bale of cotton to the acre, are now absolutely sterile, and, on some of the plantations, out of a thousand acres of land once fertile, five hundred are now worthless. There is still forest land left, which, as the old fields are abandoned, is cleared and planted, but the available territory diminishes year by year, and the inhabitants, tired of trying to get a living out of bare gullies, move away, so that it is estimated that the population of the hill counties is only about three-fifths of what it once was. Of course, every one knows, except, apparently, those most interested, that if the forests had been judiciously thinned, instead of being exterminated, and if reasonably scientific methods of treating the cleared land had been pursued, the North Carolina hill country would now be of immense value; but the mischief has been done, and cannot be undone, and, according to the best authority, even if the growth of timber could be started again, it would be a thousand years before the barren hard-pan would accumulate a new coating of soil.

IT is strange that, after the experience of two hundred years in other parts of the United States, this suicidal system of treating land should still be the rule wherever new tracts are brought under cultivation. In many, perhaps most cases, the timber standing on a piece of virgin land in any State east of the Mississippi is worth more than all the crops that the owner will ever raise from it, yet the latter, after coming into possession, knows no peace until he has cleared the timber all away, and burned it up. That it would be not only possible, but easy, to save the timber, or, at least, the salable part of it, and have the crops too, never seems to enter the head of farmers in such regions. One old Carolina planter, the owner of a tract of thirteen hundred acres, confessed that the timber which he found standing on his farm, and which he spent forty years in clearing away, would, if he had let it alone, be worth more now than all the crops put together that were ever raised on the farm. This is exactly the experience of many an Ohio and Indiana farmer, besides those of Virginia and the Carolinas, yet nobody seems to learn wisdom from their lamentations.

TOWN-HALLS.[1] — II.

FROM the Renaissance, town-halls gradually lost their primitive characteristics. Usually the campanile was the only feature retained, although the balcony was occasionally preserved, as at Rheims (1627) shown in Figure 10. But the battlements and porticos disappeared. Frequently, however, in the modern period we shall find the mediæval arcades recalled by a porch or by arched entrances. As an example of a communal building with no antique stamp about it, we call attention to the small town-hall of Beaucaire, the disposition and details of which are charming (Fig. 11). Abroad, the same path was followed as with us. It is hardly the rudiments of a campanile that we see in the Ayuntamiento of Madrid (Fig. 12), or in the Guildhall of London (Fig. 13).

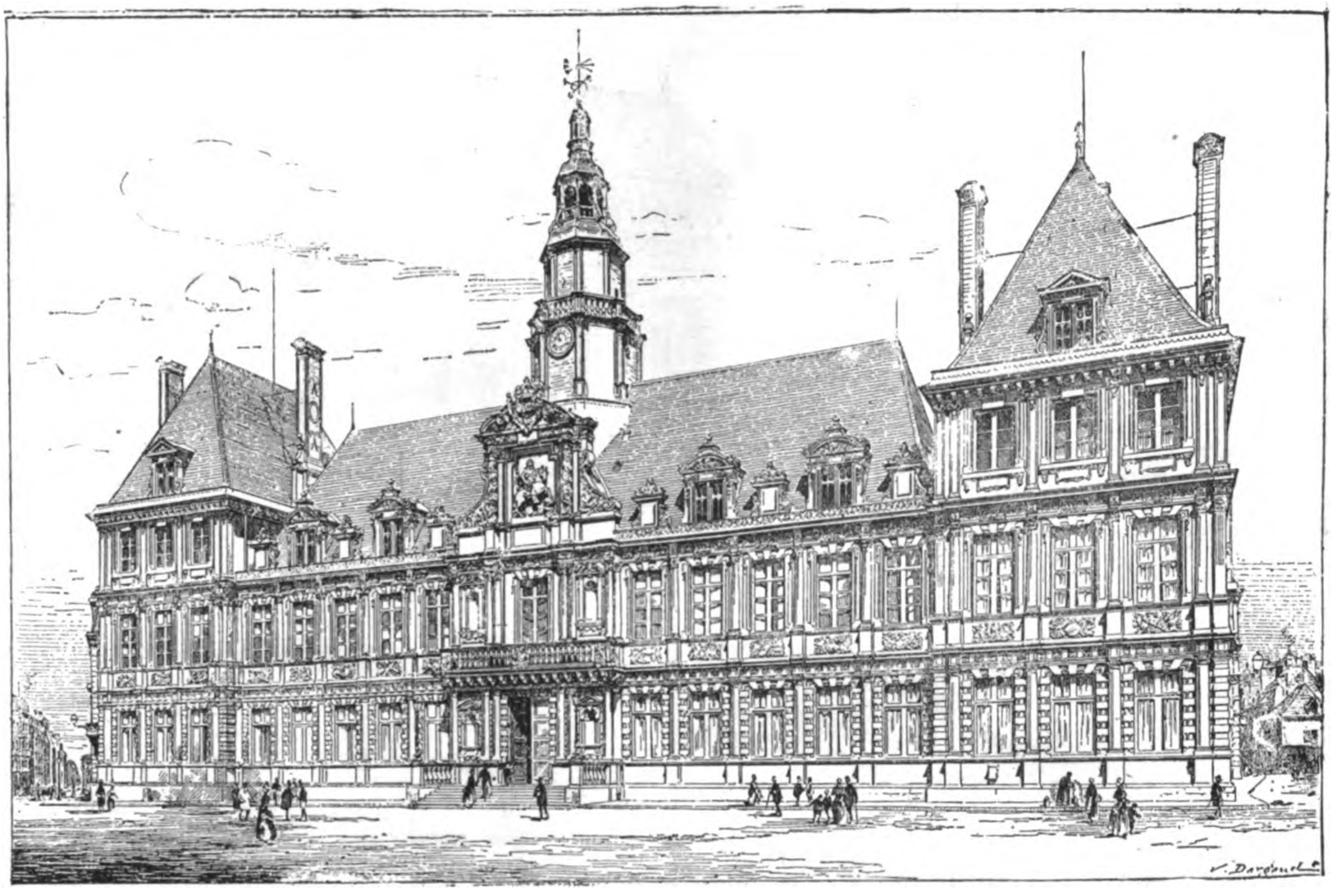


Fig. 10. Rheims.

THE MODERN PERIOD.

As we have already remarked, the present period has witnessed the advent of the *mairie*, or municipal edifice of small districts.

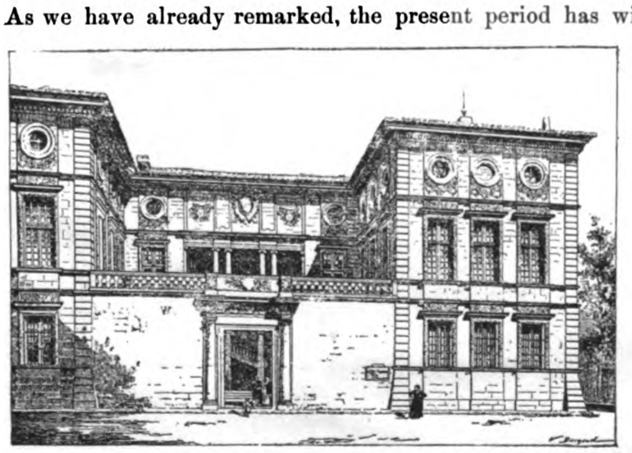


Fig. 11. Beaucaire.

Reduced to its simplest form, the *mairie* comprises only two essential apartments, the council-chamber and the mayor's office. The council-chamber can be used at the same time for the celebration of marriages. Clearly, the ground-floor of a small structure will suffice for these needs. Such is the town-hall of Beaumont-la-Ronce (Figs. 14, 15). Usually, however, when the inhabitants of a commune decide to build such a structure, they prefer to include in it all the services under communal control. For example, the school is often attached to the *mairie;* sometimes we find combined, as at Coulommiers, the municipal building, savings-bank, guard-house, engine-house, library and police accommodations (Figs. 16, 17). In this group of buildings are comprised, on the side facing the square, the savings-bank on the ground-floor of the central pavilion, with quarters for the cashier in the first story;

Fig. 12. Madrid.

on the ground-floor of the right wing, the fire-engine rooms (10) and in the first story a music-hall. In the left wing are the guard-house (6) and strong-rooms (8), the office of the captain of the post, and quarters for the sheriff. The savings-bank has a waiting-room (2) and a vestibule (2*a*) fenced off

[1] From the French of E. Rümler, in Planat's *Encyclopédie de l'Architecture et de la Construction.* Continued from No. 932, page 57.

from one another and covered by a glass roof; the counting-room (3) is back of these and the exit (4) is on a garden. A small court has been contrived in the rear of the left wing and opening on it, under a shed, are urinals and a water-closet, as well as lock-up rooms. The commissary of police has an office (15) room, for the accommodation of the municipal library (16) to which access is had by a grand stairway. Depositors find entrance to the savings-bank from the square by means of a staircase with two flights of steps, one of which leads to the vestibule of the cashier's quarters; the exit is through the garden to a side street. Crowds and obstructions are thus avoided.

As an example of *mairies* of medium importance recently constructed, we will take that of Maison-Laffitte. The distri-

Fig. 13. Guildhall, London.

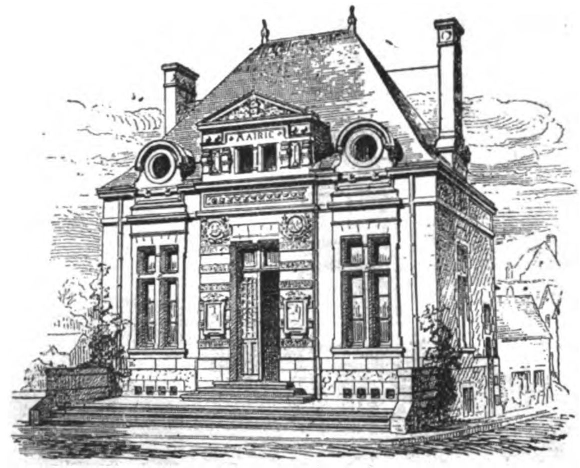


Fig. 14. Beaumont-la-Ronce.

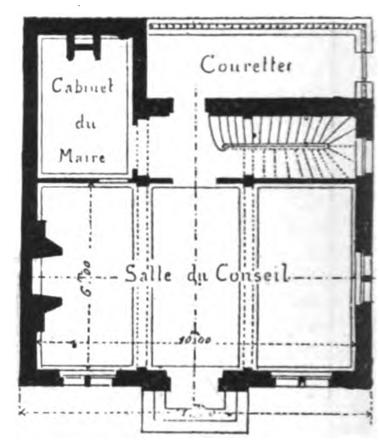


Fig. 15. Beaumont-la-Ronce.

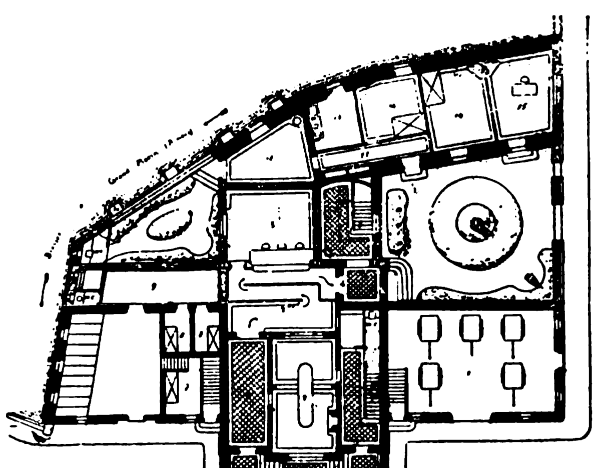


Fig. 16. Coulommiers.

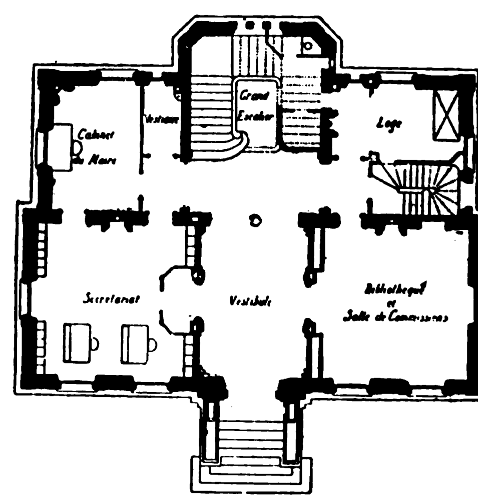


Fig. 18. Maison-Laffitte.

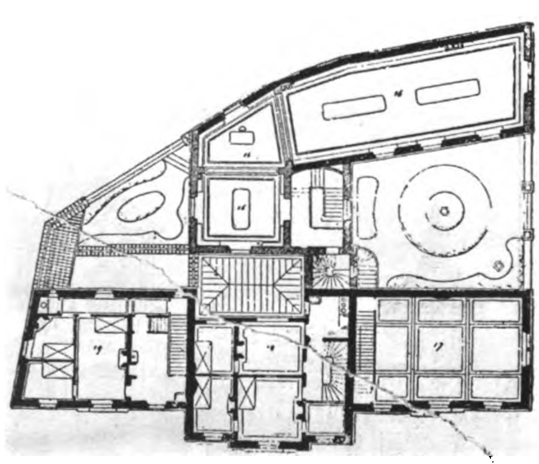


Fig. 17. Coulommiers.

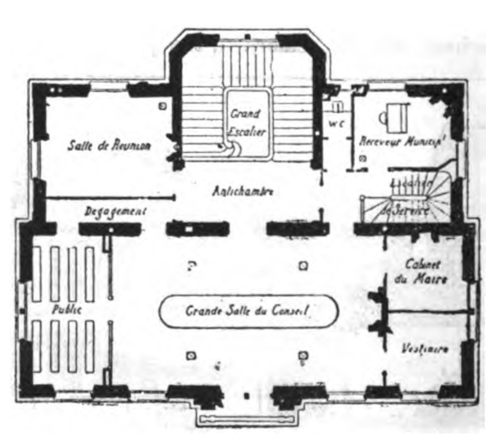


Fig. 19. Maison-Laffitte.

Figs. 15 to 19 inclusive. Municipal Buildings in France.

on the ground-floor and apartments consisting of two rooms, kitchen and dining-room (14, 13, 12). There is a separate corridor (11) communicating with these. The commissary has a small private garden at his disposal. The rooms above these apartments are designed, with the part over the counting-bution of the interior space is simple, and is made on the principle of grouping the public rooms so as to be able to throw them together, as far as possible, at a moment's notice, for a festival or any unusually large gathering (Figs. 18, 19).

[To be continued.]

MODERN ASYLUMS FOR THE INSANE.[1] — VI.

IN arranging the position of the boiler and engine houses for an asylum, care must be taken by the architect to keep them rather in the rear of the main buildings, but for all that in a central position, so as to command a flow of hot water or steam to all parts of the asylum for heating or lavatory purposes. The buildings or rooms containing the boilers and engines should for obvious reasons be situated in close proximity to the kitchens and laundry, but at a sufficient distance from the parts occupied by the patients so as not to cause them any annoyance or disturbance.

The boiler-house should be spacious, and room should be allowed for a space for an extra boiler to meet unforeseen difficulties that might at any time arise or to satisfy any future demands. There should be ample room left in front of the boiler for stoking purposes and free use of the stoking tools as well as for the removal, resetting or repair of the boilers, flues, etc.

For very similar reasons the engine-room should not be curtailed in size, but sufficient space should be provided for around the engine, pumps, etc. In ordinary asylums where electric-light is used, the dynamos may very properly be placed in the engine-room, for it affords an economical arrangement whereby one man may easily manage the engines as well as a limited number of dynamos. The engine-room should be well lighted, both by daylight in the day-time, and by artificial light at night. A moderate amount of architectural and decorative dignity should be given to this block of buildings, the reasons for which will recommend themselves to the minds of those who appreciate the important part the engine and boiler-house plays in an asylum.

The engineer must, of course, be provided with an office or room *en suite* with the engine-house; there must also be a fitter's shop near, in which to do all odd jobs.

In connection with the fire-protection of the asylum it is necessary to have a steam fire-pump, and its location should be in the engine-room, where a prominent notice-board should be displayed, setting forth the manner in which the pump can be brought into play in the absence of the engineer.

We will assume for the sake of illustration, that the boiler and engine power is required in an asylum which accommodates eight hundred patients, and that it is desired to provide power for driving the laundry machinery, the ventilation-fans, the pump for water-supply, the hot-water mains for the baths and lavatories throughout the buildings, some of which would be at great distances, as well as a supply of steam for the coils and heating pipes and ventilating extractor, coils in the roof, or elsewhere. In addition to this let us further assume that the power is also required for an ample supply of steam and hot water for kitchen purposes as well as scullery use, for steam cooking and washing-up.

Now what may be considered a fair provision for the above would be to set up six improved high-class steel single-tube Cornish boilers, each, say, twenty-five feet by five feet six inches, and furnished with furnace front-door, fire-bars, bearers, dead-plates and frames, safety-valve, steam-valve, feed-valve, water-guage, glass-rings, test-tap, blow-off cock, steam-guage, etc. The architect who undertakes asylum work and receives his commission for certifying accounts for such matters as these should surely, in order to do justice to his clients, make himself acquainted with such details of engineering as are requisite for the due perfection of the work, and he should also become well-versed in what are the customary charges for cartage, setting, fixing-up, both as to labor and material; as to the best mode of forming the flues to the main shaft; the construction of the inspection and cleaning pits, and the laying of the engine-beds and foundations.

For feeding this number of boilers, there should be two double-action donkey-pumps, each capable of feeding at the rate of about two thousand two hundred gallons of water per hour.

It is necessary that the boilers should be connected with separate stop or regulating valves, and copper expansion joints to main steam-supply, and the steam-pipe be properly connected with the engine. In addition to these appliances there would also be required a fourteen horse-power horizontal engine of thoroughly good make, which should be erected on a stone bed, with all necessary holding-down bolts; we have already mentioned the fire-pump, which should be fitted with all necessary gearing for instantaneous use.

The approximate cost in Great Britain for the works and materials in connection with the foregoing provisions for an asylum accommodating eight hundred patients, with all necessary shafting, rigger-pulleys and gearing for engines to run machinery in laundry, etc., as above described with all boilers, engines, etc., would be about four thousand pounds sterling ($20,000) but this amount would, of course, be greatly governed by the situation of the asylum and its proximity to railway, river or canal, and by other local considerations.

For a further sum of about fifteen hundred pounds the whole of the buildings may be heated from the same boilers by means of steam supply, with open wrought-iron radiators finished with ornamental tops. These radiators should have separate stop and regulating valves and air-regulators; in addition to which each block of buildings should have separate stop-valves and a steam-trap for expansion, which should work automatically. The waste from the steam-trap should be carried by means of wrought-iron pipes to an underground reservoir and the water thus saved would be available for laundry purposes or for feeding the boilers; in this manner the architect would secure economy of administration, which he should ever have in view.

In connection with the administrative block of an asylum for eight hundred patients, a cast-iron tank to hold at least seventy-five thousand gallons of water should be provided, either in a water-tower over the boiler-house, or in some such other suitable position. If a special water-tower is not erected, the architect must carefully provide for the elevation of the tank over other buildings, remembering that a tank to contain this quantity of water must be fifty feet by sixty feet by four feet deep (or the equivalent) which would weigh when filled four hundred and ten tons *i. e.*, seventy-two-and-a-half tons for the tank and three hundred and thirty-five tons for the water. Therefore great care must be exercised by the architect in providing foundations and supports, and the height to which the tank must be elevated must be sufficient to secure a supply by gravitation for the whole asylum and its out-buildings. The probable cost of such a tank and iron-work on supports would be two thousand pounds ($10,000).

There are several other items under the division of our subject which we are now considering, in connection with the administrative building, which should not be overlooked, such as the arrangement for the water-main, valves and hydrants.

For the interior of the buildings (still supposing the asylum to be for eight hundred patients), there should be twelve or more three-inch gun-metal hydrants for the extinction of fire, located in suitable and conspicuous positions; in addition to these, there should be twenty-four or more hydrants fitted about the grounds, and, in arranging the positions for these, the architect, however skilled he may be, would do well to obtain the advice of a fire-brigade expert. Each and every hydrant should be provided with a sixty-foot length of good canvas hose kept ready "married" to the hydrant, and fitted with gun-metal couplings, leather straps, copper branch-pipe, keys, wrenches, etc. Below each hydrant should be fitted a small bib-cock for filling buckets from, and it is frequently of great service in small fires to be able to fix a one-inch hose and nozzle to this bib-cock, as the great force with which the water is delivered from so small a nozzle off the three-inch main may at any time be of great service.

Hydrants should always, where possible, be fitted to the high-pressure, constant-supply main of the water-company of the district in which the asylum is located. As such a supply is not always available, it will be seen how necessary it is to elevate the tank sufficiently to obtain the force required to beat out a fire. Assuming, therefore, that the source of water is other than from the constant supply of a company, and that the water is otherwise brought to a suitable point on the site, a four-inch sluice-valve and cover should be provided and continued with a four-inch cast-iron main to the tank, and be connected with the same by a rising main fitted with a flange ball-valve, and the main of the same size should be connected with the steam fire-pump; but the fire-mains to the various blocks may be reduced to three inches, or even to two-and-a-half inches, provided an ample *force* of water is always obtainable in *sufficient quantities*.

The fittings for the hydrants, the fire-keys, hatchets, axes, cutting-hooks, helmets, etc., should be kept on a board fixed to the wall above the hydrant, and spare lengths of hose and additional nozzles should be kept close at hand in glazed cupboards, where they can be easily found. Two or three hundred fire-buckets, or even more, should be kept in all parts of the building, always three-parts full of water, and hung on pegs let into the wall just within reach; fire-buckets are the most useful fire-appliances for extinction of fire when used promptly at the early stages of the outbreak. Corridor-engines, hand-pumps, bucket-pumps, wet blankets and other recognized material for the extinction of fire should never be absent from any part or block of an asylum for the insane.

Roughly speaking, the necessary works we have now enumerated would cost from one thousand three hundred pounds to one thousand four hundred pounds ($7,000).

The approximate cost of the hot and cold water-supply, with all necessary cisterns, tanks, water-waste-preventing apparatus, water-closets, lavatories, baths, slop-sinks, scullery-sinks, urinals, pail-service, etc., would be, in an asylum of this size, four thousand pounds ($20,000).

In all the blocks of buildings there should be auxiliary water-storage, giving a separate supply. This storage should be in tanks or cisterns containing about one thousand gallons each. The capacity for the hot-water cisterns need not exceed two hundred gallons, and these might very well be heated by the steam-coils.

Although it would be somewhat out of the order of description adopted in these papers to deal here with the pattern of the fittings of the sanitary fixtures, we may mention here the number of some of the items requisite for an asylum of eight hundred patients.

There should be about one hundred and sixty water-closets, sixty-five baths, three hundred lavatory basins, seventy or eighty urinals, and a sufficient number of slop-sinks and scullery-sinks.

The machinery and apparatus required in the laundry, to which we have already referred, would probably cost fifteen hundred pounds ($7,500) for eight hundred patients, their attendants and nurses. This amount would include all gearing, shafting, etc., for he machinery, but, if trough-washing were largely adopted, the cost

[1] By George H. Bibby, F. R. I. B. A., F. R. Hist. S., and Ernest A. E. Woodrow, A. R. I. B. A. Continued from No. 924, page 159.

would, of course, be materially reduced. The above estimate would include hot and cold water supply-tanks, boiling-pans and all necessaries.

In the *American Architect* for June 24, 1893, a ground-plan of the Hanwell Asylum was presented. This asylum, on the 21st of May, 1891, contained 1,882 patients, 758 males and 1,124 females. On that day the Commissioners in Lunacy found 88 male patients and 122 female patients confined to bed, while 503 male and 787 female were engaged in some form of useful employment, being, respectively, 67 and 70 per cent of the total number of patients then in the asylum; but of the women, 465 are designated in the official return "ward-cleaners and bed-makers" only. About 550 were returned as attending the services in the chapel, and about 450 the associated entertainments in the hall. So far as we can understand, therefore, at Hanwell about 357 males are in daily employment upon various useful works on the farm, in the grounds and in the workshops.

MALES.

	BANSTEAD. 1892. March 31.	CANE HILL. 1892. March 31.	COLNEY HATCH. 1892. March 31.	HANWELL. 1892. March 31.
In Grounds, Garden, Farm, etc...	63	286	147	103
In Kitchen	22	2	22	6
In Bakehouse	5	9	15	6
In Painters' Shop	2	4	17	1
In Tailors' Shop	13	11	13	33
In Upholsterers' Shop	86	14	29	56
In Shoemakers' Shop	8	9	12	10
In Carpenters' Shop	2	4	3	3
As Coal-carriers and Wood-choppers	6	10	30	85
In Gas-house, Engine and Boiler Houses	4	5	2	8
As Helpers in Wards	129	34	119	133
In Store-room and Other Offices...	24	5	5	11
In Hall	4	29	4	4
In Corridors	6	20	1	....
In Mess-room	6	2	6	....
Assisting Bricklayer	1	2	....	....
In Laundry	....	....	10	9
Tinshop	....	....	....	4
Basket-makers	....	....	....	1
Painters in Wards	....	....	....	14
Firemen	....	....	....	1
Bookbinders	....	....	....	2
Flower-makers	....	....	....	4
Total Employed	381	446	435	494
Unemployed	98	94	301	186
Sick, Infirm and Old Age	237	59	184	80
Absent on Trial	....	1	2	1
Total in Asylum	716	600	922	761

FEMALES.

	BANSTEAD. 1892. March 31.	CANE HILL. 1892. March 31.	COLNEY HATCH. 1892. March 31.	HANWELL. 1892. March 31.
At Needlework in Wards and Workroom	247	220	222	234
In Kitchen and Vegetable-room..	....	34	....	....
In Laundry	62	88	119	64
At Officers' Apartments	14	7	5	3
As Helpers in Wards	243	124	363	460
In Mess-room	4	2	10	....
Total Employed	570	475	719	761
Unemployed	476	216	392	271
Sick, Infirm and Old Age	247	106	215	104
Absent on Trial	....	2	7	4
Total in Asylum	1,293	799	1,333	1,140

Upon statistics gathered from sources such as these, the architect must base his calculations for provision of space allotted to workshops. It is calculated that about forty superficial feet of space is required per patient in each of the workshops. Reference has frequently been made in these papers to the four great asylums of London. Following up the description of these institutions, the tables we now give, showing the number of persons employed in various works, must be of great service to the architect in enabling him to form his judgment upon a reliable basis of the number and size of the rooms he must provide to meet the many demands of the asylum. A rough-and-ready rule for ascertaining the size of the work-rooms is to multiply the number of working patients employed in the rooms by forty; this will give the superficial area in feet. It must, of course, be borne in mind that in a country asylum a greater proportion would be employed on the farm or in other out-door work than in the workshops. From these tables, it will be seen that a greater area is required for upholsterers' workshops for male patients than for any other pursuits, exclusive, of course, of out-door employment on the farm or in the garden.

It is advisable as a general rule that the workshop buildings should not be more than one story in height, and that there should be sufficient store-rooms adjacent for manufactured goods as well as the raw materials used in the manufacture. The windows should be on both sides of the various apartments, which should always be light, bright and clean and as cheerful as possible for the patients' sake. There should be special arrangement for water-closets and lavatories in the workshop block so that the patients need not return to their own wards and thereby waste time and go beyond the observation of the attendants.

The articles chiefly manufactured by the patients in the upholsterers' shops are mattresses, paillasses, mattress-cases, pillows, carpets, blinds, feather-beds, chaff-beds, hassocks, chair-cushions, sofas, etc., etc.

In the shoemaker's shop not only boots and shoes are made, but also harness, firemen's leather helmets and belts, attendants' belts, sewing-machine bands, pouches and leather articles for various use.

Of course, considerable employment is found for the patients in and about the farm buildings and grounds. At Hanwell Asylum in 1892 the live-stock for 1,900 patients consisted of eight horses, thirty cows, one bull, ten heifers, three calves, eighty-nine pigs, two hundred and six fowls and eleven ducks.

The farm buildings for an asylum would closely resemble those for any ordinary farm and the extent must depend upon various circumstances. A large proportion of the produce of the farm would, of course, be used in the asylum itself. At Hanwell in 1892 we find there was produced and consumed

		£	s.	d.
29,580	gallons of milk, valued at	1,183	19	10
14,316	eggs	59	13	0
2,892	bushels of potatoes	275	6	10
7,847	" " cabbage	326	19	2
837	" " carrots	83	15	0
986	" " parsnips	73	19	9
552	" " onions	69	4	3
653	" " turnips	27	4	7
1,599	" " beans and peas	159	19	0
	Fruit, salad and herbs	220	5	7

These items may serve to indicate to the architect an approximate estimate of the accommodation to be provided in the various farm buildings, the size of the stables, cow-houses, piggeries, cart-houses, provender-stores and dairy-buildings, all of which should be of such proportions as to be ample for the required purposes.

The bath-houses should be placed in such a central position that they may be easily approached by the patients located in the chronic wards; the best arrangement is, perhaps, a long room with divisions or cubicles for each bath. The bath should be arranged so that the attendant could if necessary stand on either side of it, so as to be able to control the violent patient, or be able to attend to one requiring special care. It need hardly be pointed out to the architect, that he should provide such arrangements of valves, that it would be impossible for the patients to be scalded, either by their own interference with the taps or by reason of possible carelessness of the attendants or nurses: there have been many instances where patients have been severely injured or even scalded to death in this manner.

Near the bath-room there should be a room for towels and linen, and there should also be sufficient water-closet and urinal accommodation in connection with the bath-house.

Instead of separate cottages for the attendants, it is sometimes preferable to build their apartments in a small block opening off the main-building corridor. Figures 1 and 2 illustrate this system. In connection with these apartments there should be arranged a billiard-room and reading-room as shown in the plan, this is especially necessary in large asylums, where in addition there may be also club or recreation-rooms, for the special benefit of the attendants and doctors, as well as a music-room for band practice or any use of a kindred nature.

The nurses and attendants must, of course, have separate sitting-rooms and mess-rooms for each sex, where they could associate and enjoy themselves when off duty. Suitable bedroom accommodation must also be provided for those who sleep in, or adjacent to, the wards.

In large asylums, an isolated block should be provided suitable for the purposes of removing thereto sick attendants and nurses, or any suspected of fever or infectious sickness, or who are in need of rest and quiet to recruit their strength.

A dispensary is absolutely necessary in all asylums, and, in connection with it, there should be accommodation for drugs and instruments in a small room or closet. Unless the asylum is of very considerable extent, an operating-room need not always be added to this department; but, where such is required, the architect should arrange his plan so as to secure for this room a top and north light, so as to give a perfect means of throwing all possible light upon the patient when strapped to the operating-table. Near to the operating-room there should be accommodation for sleeping apartments into which to remove the patient immediately after an operation. These should be closed by double doors, to exclude all sound, so as not to risk alarm or distress to either the attendants or the patients. The floor of the operating-room should be covered with lead.

An isolation hospital for patients attacked with fever, etc., should be placed in such a position that all people, whether patients or attendants, need not approach it nearer than absolutely necessary. However good the general drainage system of the asylum may be, it

is most desirable to have a distinct and separate system for the hospital. For this reason, it should be erected in such a position that its sewage need not pass into the drainage flowing from the asylum.

There should be dormitories for each sex, with one or two single rooms for males and females. It is a good plan to arrange the nurses' rooms with inspection - windows that command a view of a dormitory as well as the single rooms. The water-closets, lavatories, slop-sinks, baths, etc., should be in one annex, separated by a short open-air passage. There must also be a kitchen and a separate laundry with means of disinfecting clothing and bedding. The whole block should be railed or fenced off, to prevent too near an approach of all except those immediately concerned with the administration of the building.

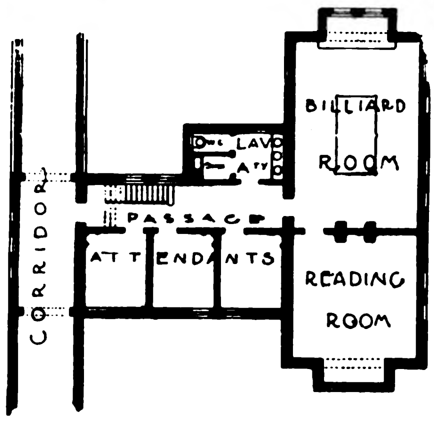


Fig. 1.

The church or chapel in an English asylum, and the patients' library should be placed in a most important position in relation to the whole scheme of the asylum and surroundings. The duties of an asylum chaplain are little understood by the general public, and they are much more onerous than is probably imagined. Although to many of the unfortunate patients his services are of little or no avail, yet his opportunities of usefulness to many of the inmates are often found to be of great benefit, not only in religious matters, but also in the direction of their attention to books, and in persuading them to take notice of newspapers or other literary amusements whereby beneficial and healthful occupation is obtained for the mind. This is often the means of destroying melancholia and commencing the first steps towards convalescence. The chaplain includes in his duties the visitation of the sick and infirm patients and the administration of all religious offices to the attendants and nurses, and to those who attend as visitors the funerals of patients to whom they may be related or on terms of friendship before the mind had become unhinged.

At Cane Hill Asylum, where there were 1,112 patients in residence, it was found that the Sunday services were attended by as large an average as seven hundred persons, which probably included some of the officers off duty. It will, therefore, be perceived that the architect must provide of necessity for a church of considerable capacity.

The best position for the church, with respect to the general buildings and wards of an asylum, is a disputed question, but it should, in our opinion, be certainly in direct connection with the asylum by a corridor or covered way. The church should be planned and arranged, as far as means will allow, in all respects like an ordinary church, and there should be nothing in the design to destroy this idea. There should be ample means of exit, the doors opening outward, and a separate means of entrance for males and females.

In connection with the church there should be provided two rooms about ten feet square for each sex, that would at all times be available for the immediate and prompt removal of any patients taken ill, or having fits, during the service; this obviates the necessity of a long journey to the wards and delay in attending to the patient, a most important matter. Sometimes it may be found necessary to provide a room to be used as a separate chapel for the use of the Roman Catholics. In an English asylum containing 2,000 patients, it has been found that 240 were Roman Catholics of which number 100 might attend mass.

The library, which is under the control of the chaplain, might with advantage have attached to it a smaller room, to be used as an office, private or reception room, by the chaplain. The selection of books should not usually be left entirely to the chaplain, as he may have too narrow a view in this matter. The Commissioners in Lunacy in a recent report drew attention to the scarcity of books of an amusing nature in asylums, and the plentiful supply of bibles and prayer-books. Newspapers and periodicals should be provided in variety and numbers.

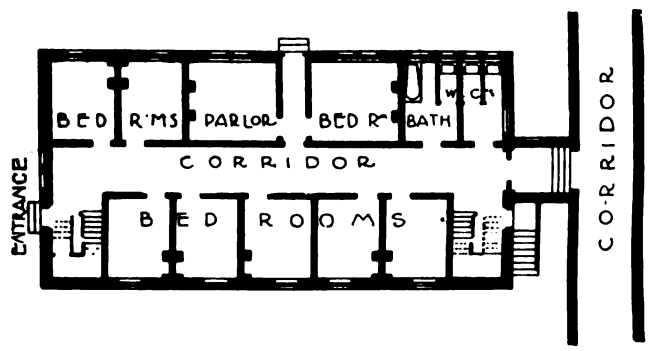


Fig. 2.

In arranging the various buildings appertaining to an asylum and which we have so far endeavored to describe, there had been much inclination upon the part of architects in recent years to adopt the same system for the general arrangement. The scheme of the second Gloucester Asylum (Fig. 3) has been more or less repeated at Mentson Asylum in the West Riding of Yorkshire and at Claybury Asylum in the County of London, a block-plan of which appeared in the *American Architect* in the issue of June 24, 1893. The angles at which the corridors are placed vary considerably in these asylums, but the motive is very much the same in all cases.

The second Gloucester Asylum, of which Messrs. Giles and Gough are the architects, is built upon what has been described in England as the "broad arrow form of the pavilion system." Since the appearance of this design, the arrangement has been frequently adopted in England; it is a very suitable form also for a general or fever hospital. In this example the entrance-hall is particularly good, and well arranged; beyond are the kitchen, dining-hall and steward's department. The dining-hall is a room of good proportion,

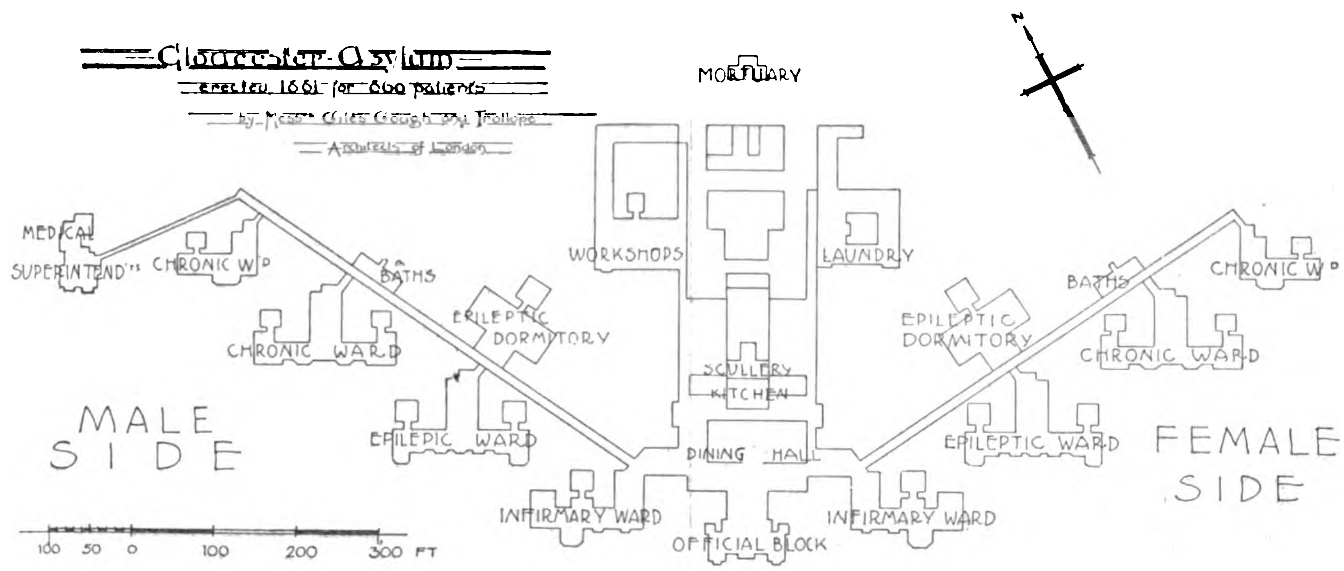


Fig. 3.

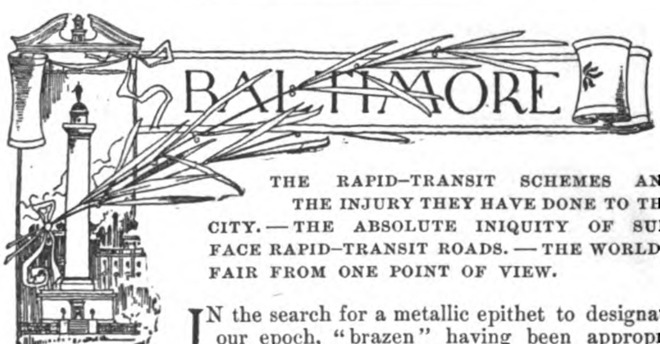
well-lighted and ventilated by dormers. The artificial lighting-system is by electricity. At one end of the hall is the stage, as described in general terms in a former number of these articles. In the kitchen gas only is used, and it is manufactured by a means of decomposition of water, and produced at three pence per 1,000 feet.

It will be seen from the plan that at either side of the administrative blocks are the infirmary-wards, the ground-floors of which consist of day-room space, single rooms and dormitory accommodation. This asylum is for 900 patients and since its erection the authors of the plan have made many further improvements upon the old system of arrangement. They have designed the Imbecile Asylum, Caterham, for 2,000 patients; the Kent County Lunatic Asylum for 900 patients; the County Lunatic Asylum, Glamorgan, for 900 patients; the Abergavenny Asylum for 300 patients; the Suffolk County Asylum at Melton, for 160 patients; Joint Asylum at Carmarthen, for 120 patients; the Somerset County Asylum for 700 patients and the Cheddleton Asylum (in Staffordshire) for 800 patients.

In a later paper we purpose to give a list of a large number of asylums, with prices per patient, but in the first instance we propose to deal with some further details connected with the buildings, etc.

E. A. E. Woodrow.

[To be continued.]



THE RAPID-TRANSIT SCHEMES AND THE INJURY THEY HAVE DONE TO THE CITY. — THE ABSOLUTE INIQUITY OF SURFACE RAPID-TRANSIT ROADS. — THE WORLD'S FAIR FROM ONE POINT OF VIEW.

In the search for a metallic epithet to designate our epoch, "brazen" having been appropriated, while "golden" is only for the past or the future, the last resort was a compromise on "wire." Has one never suggested the "bell-and-button?" It certainly seems that, if by some decree these all-pervading little factors should suddenly be eliminated from our modern civilization, the wheels of nineteenth-century progress must cease to move — and individual human life probably be prolonged. Hitherto it was presumed that average humanity wished to remain on this pleasant earth as long, as agreeably and as restfully as might be. Now it would appear that the chief end of man is to traverse its surface as rapidly and leave it as soon as possible, having once "gotten there," to that all-to-be-desired bourn, the end of the route — and all "rapid-transit" routes must sooner or later be exhausted. But already the faint murmur of the inevitable reaction is being heard in the land. "Almost I am persuaded to wish that electricity had never been discovered," we hear exclaimed by the weary man who has no stock in any of the successful corporations and who begins to remember the former days of comparative repose and the despised horse-car.

When we saw it published a few days ago that within the last three years Baltimore has spent ten millions of dollars in developing within its limits and suburbs two hundred and fifty miles of various kinds of rapid-transit railroads, and we noted the total transformation this has wrought in the character of a large number of the city's principal streets, we could but feel that this conservative individual is not altogether in the wrong; and as day by day the streets become more and more occupied and obstructed by the electric and cable cars, with all the numerous sources of danger and annoyance they bring in their train, one of the most conspicuous features of this recent rapid-transit development in Baltimore, in all seriousness, is its object lesson of "what not to do." The necessity for some form of rapid transit in and around all large cities, connecting certain important points, is now universally admitted. That the indiscriminate use and practical control of a majority of a city's chief thoroughfare by rival companies with their various systems of cable and electric cars, quite needlessly paralleling each others' lines in close proximity, is not the proper way to solve the problem for the best advantage of the public, must also be admitted, and indeed is no longer denied by a vast number of much-suffering citizens. It is just this thing that has been done in Baltimore. In the first enthusiasm for progress and development every new scheme of rapid transit was welcomed and extolled, and the franchise readily granted, heedless of a few warning voices raised here and there, and with scarcely any intelligent consideration of what the final result to the whole city would be in the danger, noise, dust and disfigurements of streets that inevitably must follow.

The especially objectionable features of this condition of things in Baltimore is that the eight important north and south streets, excepting only Cathedral Street, lying together directly through the centre of the city, are all occupied, either in whole or part, by some line of double-tracked railroad; this is also the case with a majority of the east and west streets. Many of these streets are those upon which are located the most attractive residences and many churches and other buildings for which a comparatively quiet, well-paved and unobstructed street is essentially desirable. The rapid-transit lines have totally destroyed these important features, and in addition have made things hideous to look upon with their poles and wires. A remarkable fact in regard to all this, making things more unfortunate for our city than for most others, is that the pleasant former things are all disappearing, rapidly and entirely, with nothing in immediate view to take their place, no street remaining at present capable of any extensive development for handsome and costly improvement in any direction, except to the most limited extent, being already impeded by buildings of inferior character. Mt. Vernon Place and its immediate neighborhood remains unmolested and is still most attractive, and those who consider Eutaw Place a desirable location for residences may claim it also as an exception. This condition of things and the specific injury done to the best streets — and hence to the whole city — is a present-existing, indisputable fact, severely felt by the citizens, and observed with unfavorable comment by strangers, a fact as evident and important as anything that is asserted by those who, taking another point of view, claim that they are converting Baltimore into a great commercial and manufacturing centre. But if in doing this they are at the same time destroying it as a social, literary, artistic and educational centre, and are ignoring the fact that general beauty, comfort, elegance and carefully preserved points of monumental and architectural interest are universally regarded as highly important factors in the making of all really great cities, we emphatically assert that they are doing to Baltimore a great and lasting injury.

Such considerations lead us to ask seriously whether any form of rapid transit can really exist through the streets *and on the surface* in any large city and be anything but a name or an absurdity, if at all restricted by such regulations as are eminently necessary for the safety and comfort of the people, the amount of time gained being not very many minutes in the half hour, while the dangers and annoyances are excessive. The two ways of solving the problem — beneath the surface, as in London, above it, as in New York — have their advantages from many points of view, but have also many remaining objections. There seems to be only one scheme offering really satisfactory results, namely, to frankly condemn several already existing thoroughfares, or to create other new ones, directly through a city in the directions most needed and connecting the most important points; to appropriate these thoroughfares, in whole or part, solely to the purpose and to concentrate all rapid transit upon them, either on the surface or above it, or both, as one would for a through-line of steam railroad, with all possible arrangements for safety and comfort surrounding them, involving large expense and labor at the outset, but satisfactory and permanent in its results. Largely owing to a partial development of such a scheme for its rapid transit, Chicago, with all its vast area, population and traffic, is now, beyond its chief avenues, a quieter city than Baltimore.

Speaking of Chicago, one cannot do so to-day except in the same breath with her marvellous offspring, "the Fair." Chicago has had "her day" — the newspapers of the whole world are this morning telling the story of the seven hundred thousand "head of people" she crowded through her big Fair gates — with the natural attendants of crush and injury and death — in order to make the proud boast of having done the "biggest thing on record" for one day's work, with no other ultimate object in view or apparently desirable results accomplished.

While we pause to take breath after hearing of this multitude, one may, almost at the end of the great World's Exhibition, and in the natural reaction after the somewhat superlative and indiscriminate admiration, enthusiasm and patriotic self-applause, somewhat intelligently review one's impressions and distinguish more accurately between the many features of extraordinary merit, and the many others of comparatively far less value or importance.

In the first place one involuntarily asks if, from the point-of-view of international interest and attendance, this big thing in our land, in the year eighteen hundred and ninety-three, is not rather a marvellous and magnificent Western-American and Chicago Fair than a great World's Exhibition, in comparison with Paris of 1889, or even with London of 1851, and whether among the twenty millions that will make the total attendance, one man in a thousand is a foreigner or one in a hundred from our own Eastern States? We may possibly console ourselves with the reflection that this is the foreigner's loss rather than ours.

We leave unquestioned the conspicuous facts of the exceptional facilities of the site for grand effects — the exceptional artistic skill of Mr. Frederic Law Olmsted in his development of architectural landscape — the wise selection of the architects for the buildings, and the wonderfully beautiful results (in most instances) of their labors, together with the liberal, patriotic, confident public spirit of Chicago in its contributions of money. These things are in the mouths of every one over the whole country, with only words of praise.

We are dealing now with only the general and architectural aspect, and one may safely say that, standing in the Court of Honor — particularly at the memorial Column, and viewing the Agriculture and Machinery Halls on either side of the lagoon, one receives an impression of monumental grandeur, elegance and beauty, probably never attained at any one spot in the past, and that possibly may never be again in the future; and as we go to the northern extremity of the grounds, once again we are excited to enthusiasm by the Greek

Classic façade of the Fine Arts Building reflected in the waters of the lagoon at its foot. Future criticism will regard these as the preëminent points of merit in the Chicago Exhibition. Will it not also say this? — that beyond these great "*pièces de resistance*" there was too much space covered, too much variety on the ground, a total lack of system or consistent arrangement of the minor buildings, an inadequate and inconvenient means of transportation to the grounds and of intercommunication between the important points, while such things as the half-real, half-sham exhibits of the Midway Plaisance will be relegated to a list of mere shows to satisfy an idle, often a vulgar, curiosity. And one other thing a calm criticism must truthfully record, that the grand buildings are not buildings of architecture at all, but professedly — and with unparalled success — merely perishable screens, built around the exhibits, with the purpose only of producing great architectural impressions and object-lessons upon the exterior. For real architecture, as fittingly applied to its purpose and for the best systematic and comprehensive arrangements of the whole scheme must we not rather turn to the Exhibition buildings of Paris, and, as education for the public, ought we not emphasize the fact in all unprejudiced criticism?

THE CLOSE OF THE FAIR. — THE EFFORTS TO PRESERVE AND SECURE CERTAIN COLLECTIONS. — MARSHALL FIELD'S GIFT OF A MILLION DOLLARS. — THE ARCHITECTURAL CHARACTER OF FOREIGN AND DOMESTIC PAVILIONS. — AMERICAN *vs.* FOREIGN STAINED-GLASS. — AWARD OF MEDALS TO THE ARCHITECTS.

THE first of November has arrived and with it the closing time of our great and beautiful Fair, only a few of our citizens experiencing that pleasing sensation which according to the old adage is said to come on Saturday night after a whole week of exemplary conduct. We have indeed "tried to be good," not only for "all the week" but for six months, doing our part, we feel, well in the great undertaking; but, still, that all this wonderful Fair is to pass away from us forever brings a feeling of actual sadness, and it has not been hard to imagine that around the Court of Honor and grand buildings, that were so gay and radiant in the June and July sunshine, a certain melancholy beauty has hung, on these cold afternoons of the closing days, when gray skies and leafless trees, and gray white-capped lake were their only background. The local papers have not failed to applaud us for all we have accomplished in this month alone, and astonishing have been the comparisons made in figures over the results accomplished in the mere matter of attendance. As all the world knows, if a little modest repeating of the fact could spread the intelligence, on Chicago day we mustered 716,881 souls to celebrate the anniversary of our great fire twenty-two years ago. The greatest day at the Paris Exposition shows the figures 397,150, while the Quaker city considered 217,526 as a brave showing for her most crowded day. The papers admit that Xerxes's army did outnumber our vast concourse, but that such a crowd was well handled by the railroads, boats, etc., with so few serious accidents does give us cause for self-congratulation over the careful thought that must have been put into the management. We fully realize that the Fair has closed when the Director of the Works, Daniel H. Burnham, sends in his resignation. To him this season must come as a time of well-earned rest, and must be to him an especially pleasant one, as there can be so few regrets on his part over any desirable result which he has failed to accomplish in connection with the great undertaking in which he was so important a factor.

So we realize our "day after" has arrived and we give up with great reluctance our Fair to which all the world has contributed.

That all may not depart from us forever, all sorts of enterprises are on foot to secure first this and then that collection as the nucleus for museums of different kinds. Chief amongst these is that to create what would be known as the Columbian Museum. It was first proposed to erect for this purpose a building in one of the parks, but it is about fully decided to preserve for the use of such a collection the Art Palace in Jackson. The Directors are willing to sell to the Park Commissioners for a merely nominal sum the Art Palace, and now Mr. Marshall Field has made an offer of one million of dollars toward a museum fund provided five hundred thousand be subscribed by others interested in the project. Mr. George M. Pullman has been the first to subscribe one hundred thousand dollars toward the five hundred thousand desired, so that it is to be hoped the fund will not be long in being raised. The idea seems not to make the collection one of fine arts, but of a similar character to that of the National Museum in Philadelphia, which was the outgrowth of the Centennial. It is hoped it will be possible to obtain the fine collection of woods in the Forestry Building, as well as much of interest from the Mines and Mining exhibit. The chief points of interest will be drawn from the Ethnological collection, which it is to be hoped it will be possible to purchase nearly as it stands. Several valuable collections have already been presented to the museum. The idea seems to be to preserve the Art Palace in its present state as long as possible, and then to gradually replace with terra-cotta the staff coating which covers the brick. At the present writing nothing has been reduced to a certainty, but it is to be hoped that before many weeks the museum will have become more of an assured fact and the preservation of the Art Building definitely determined upon. Doubtless this scheme if carried out will somewhat interfere with the modest project mentioned in the last letter, which originated in the Illinois Chapter of the American Institute of Architects, of starting the nucleus for a collection which should be of strictly architectural interest. This collection would doubtless contain a good many things which would not be deemed suitable for any other museum, so in a measure the Chapter's scheme may still be carried out.

The Armour Institute is being especially active in collecting the nucleus for a museum of its own. This will be probably more of the nature of the collection of the Academy of Science, which has just laid the corner-stone of its new home which is located in Lincoln Park. This society, it is reported, expects to add to its present collection much of interest from the scientific displays at the Fair. The society has been looked upon by the Smithsonian as the repository for duplicates of its own collection, so this institution has already made to the younger society valuable gifts. The building of the Academy, as the published prints show, is to be of Classic style, which we can now expect will blossom forth over the whole land after its so successful use at the Fair.

The Art Institute, beside the suberb collection of casts from the Trocadéro, is in hopes of obtaining some of the valuable art treasures of the Fair. At present there is housed here the very curious collection[1] of old Egyptian portraits which has through the summer been seen in "Old Vienna." Most of the pictures, so the description says, were brought from the neighborhood of Rubaijas near the ancient capital Faijum. They are of Greek workmanship, and date from about the first century before Christ, belonging to the Greco-Roman period of Egyptian history. They are painted on thin panels of wood, apparently in oil, and were used to put over the faces of mummies instead of the old plastic masks of the older epochs. They were supposed to be portraits of the deceased and the amount of realism in the work is curious as well as surprising. Even the costumes and the dressing of the hair, especially of the females, does not strike one as anything strange or unfamiliar. Certain aristocratic old ladies it is possible to have an actual intimate feeling with, so like they are to old ladies of our own times. There are several pretty girls in the collection who would not in the least look curious in any modern ball-room. The men seem to have adhered more to the customs of the ancient Egyptians and in several we see the "lock of youth," though the cut is a little changed since the days of the Pharaohs. The whole collection is certainly most suggestive.

One feature of the Fair, full of architectural interest has been the treatment of the pavilions and booths in different large buildings. It is to be regretted that this subject was given apparently so little thought by the exhibitors and that men of so little ability, in many cases, were chosen to make the designs. Some of the booths were poor enough to attract attention to themselves, a much larger number were perfectly unnoticeable one way or the other, and compared to the large number of the whole, a few stood forth marked by careful thought and study as successful creations in their line. The American exhibit, naturally as being a very large one, was not grouped in any one grand pavilion as were most of the foreign nations, but was comprised of entirely distinct booths, which in the Manufactures Building, in their close proximity to each other often lessened the effect of what might otherwise have been good work. An example of this was seen in the booth used by the Adams & Westlake Co., which in itself was a very successful little Greek structure, but which by being placed under the gallery, side by side with booths of different heights and hues and a quite indifferent character, lost much of its charm.

The Andrews Furniture Company had, not far from this, their booth of rich and expensive wood, but so designed as to lose much of its charm to many eyes. The fine ironwork and mahogany could have worked-up into a most pleasing composition, but the Classic details of the frieze combined with Romanesque ornamentation on the lower part of the work, with unsatisfactory proportions of what were intended to be Classic columns, did much to mar the good general effect. It is to be regretted that in this American section of this Liberal Arts Building were many booths of the large and loud description, poor in material and with ornamentation of the jig-saw variety which decidedly lowered the general average of excellence. The Montana fossilized-wood exhibit had a characteristic booth in which tree-trunks and bark were everywhere used to the exclusion of finished wood.

One very charming little exhibit was that made by the Northwestern Terra-cotta Company. The exhibit was in the form of a small Gothic structure, consisting of eight arches and eight dividing columns, on which rested an open-work ribbed roof. Curiously enough, though the little structure was Gothic — though not the Gothic of our century — the designer introduced as ornamental detail a modified Renaissance in which Gothic foliage was adapted to Renaissance outlines. The result was most satisfactory because well done.

[1] At this moment this collection is on exhibition at the Boston Museum of Fine Arts. — EDS.

Above each column small Gothic arches were introduced, in the niches of which stood little figures quite in keeping with the spirit of the whole, each bearing in his arms some ornamental bit of terra-cotta, a vase, a small bust, an architectural ornament or what not. The only weak point was some female heads quite modern in feeling used in the interior on the brackets from which the ribs spring. The outsides of the Gorham and Tiffany exhibits, which stood side by side, were decidedly disappointing. The Tiffany section was less aggressively bad, but anything more meaningless than the Gorham design it would be hard to find in the whole building.

England's exhibit was the only one among those of foreign nations which was made like the Americans in detached booths, with apparently little or no plan for a general whole. In the earlier days of the Fair many of the exhibitors in this section imitated that exclusive spirit displayed so successfully in the Victoria House, and which is so eminently appropriate to be found among the displays at a World's Fair. It was for weeks the custom to protect one of the fine jewelry exhibits with ropes stretched around the whole, so that the too curious public could be kept several feet from the cases. Every one knows that this is a very satisfactory way of viewing the fine work of the gold and silver smith. Public opinion or common-sense finally broke down this barrier, but the Royal Commissioners have to the very end enjoyed their pleasant seclusion in the Victoria House on the Lake Shore, only allowing the too curious visitor to inspect their retreat for three hours in the day, and at this time moreover to have their steps guided by a path laid out between ropes. Had all the foreign exhibitors evinced this same spirit, the possibility of seeing the Fair rapidly and successfully would have been greatly increased and the tempers of the average American guest have been decidedly improved. Next to England, Canada had her pavilion which in point of any studied whole excels that of the mother country.

Germany had for the central feature of her pavilion the iron gates before alluded to, while at the corners were very pronounced compositions in the German Renaissance.

The pavilion of France, like all the work of that nation, was most carefully studied and showed the usual marks of education. There was a certain pretentiousness about the central entrance not entirely to be desired. But the interior arrangement was most satisfactory. The whole was divided into rooms, all having some sort of ceiling or canopy, and by not leaving the exhibit open to the roof, as in most cases among foreign displays, gave a much more finished and elegant appearance to the divisions, though perhaps this was done at the expense of a little light. In the room where were placed the specimens from the national factories, tapestry formed the walls and frieze. In many of the sections names of men and of places particularly celebrated in that especial department were introduced as an element of decoration in the friezes. In the room where the laces and textiles were shown a very successful ceiling was made of canvas, in which patterns had been cut out in excellent designs. Over the central lace exhibit a large square of such work was stretched, while around it the space was filled by a coarse lace-like net which softened but did not exclude the light.

Russia, Norway and Denmark in the main building have all been spoken of in these letters as being most satisfactory and interesting. Italy from her place under the gallery was hardly given a chance to make an attempt at any architectural feature in her pavilion. Where the beams, however, did not crowd too much upon her, she made a very attractive entrance, and one which in any other position would stand out distinguished by a good deal of elegance. Siam, India and Ceylon have all been previously mentioned and, though small compared with the exhibits of the larger nations, were some of them extremely interesting, and contained some very beautiful features. Spain in the Liberal Arts Building made a very poor showing both in her exhibit and in her pavilion, which was simply an indefinite repetition of heavy wooden Moorish arches supposed to suggest to the eye of the spectator the beauties of the Alhambra.

The booths or pavilions in the Electricity Building were, as a rule, extremely simple and from the nature of the exhibit hardly capable of any architectural treatment, being most of them arranged simply for the evening electrical display. There were two notable exceptions to this rule, however, in the pavilion of the Bell Telephone Company, wherein was located the central telephone station of the Fair, and in that of the Western Electrical Company.

The Bell pavilion was in the form of a very excellent little Greek structure, good in form and detail, through which visitors passed and in which, on one side not too conspicuous from the outside, were hidden away the telephone girls.

The pavilion of the Western Electric Company was a near neighbor to the Bell, and was entirely unique in its character. It took the form of an Egyptian temple. The simple mouldings, the winged symbol over the door were all in pure Egyptian style and the colored figures at first glance seemed as purely Egyptian as Pharaoh himself, and it was only on closer inspection that you saw the element of humor as well as of careful study that had entered into the composition. Above the door were two seated female figures apparently of as purely Egyptian type as the wife of Ti herself. They were, however, employed in the unusual occupation of putting pegs in place at the central office of a telephone station. At each side of the door hanging down as a graceful bit of decoration were the telephone wires, while at the base a matron, evidently of high degree, sat with her ear to the receiver, while a slave stood at her side fanning her. This was only the introduction to a whole series of caricatures running around the whole frieze of the building and down the sides. Egyptians in characteristic dress are employed in laying the wires; in telegraphing; in presenting the invention to the king, while the dog-headed and eagle-headed gods stand on either side of him as is often seen in the old decorations, as the accompaniment to royalty; in telephoning in hot haste for the patrol, which comes in a chariot with prancing white steeds; in telephoning for the fire-department, the call being answered by men bearing between them the hand-pump, similar to that used by some of the Oriental nations to-day. Thus the designs ran on, and while they, in their coloring and good drawing made a very charming decoration, afforded an amusing subject for study and gave evidence of decided inventive faculty, besides the technical skill displayed. The interior display of the pavilion was chiefly that of electric lights and those used in combination with stained glass. The ceilings of the two small rooms were of glass in very good Egyptian designs, while the columns were of hollow glass illuminated from within. The shafts of the columns were of green glass simulating the lotus stems while the capitals were both of the bud and blossom form.

Another very charming bit of decoration from the hands of this same designer was to be found, not in a pavilion, in fact, but in the Children's Building, a building erected for the temporary home of the children whose parents were obliged to bring them to the Fair. The exterior decoration of the structure was very simple but very satisfactory and suitable for the place which it ornamented. A broad frieze in bright and delicate colors passes quite around the building, while underneath the frieze were medallions in oil of the different babies of all nations, from the little negro with her sunflower to the esquimau with his furs. The medallions were enclosed in conventionalized borders, which made them a more decorative feature than without, as the children themselves were not strictly decorative in treatment.

Returning to the pavilions: the Agriculture Building afforded us several excellent examples of them, surrounded on all sides by the generally much-admired productions in corn and grain. This use of grain and corn was in many cases ingenious, though it may have fallen short of reaching a high artistic standard.

Denmark's agricultural exhibit was housed in a pavilion whose entrance was through a small farm-house of open-timber construction with thatched roof. A stuffed stork on the ridge-pole gave a realistic touch to the whole. Japan kept the same spirit of rural construction, enclosing her exhibit in not much more than a high fence, but which had a decided suggestion of a Japanese farm building. The lower part of the fence, if so it can be called, was of bright green rushes braided into a solid surface, while above a row of latticed windows looked out from a low-eaved roof of common pine boards, but which were laid in such a manner as to give a very Japanese effect. Gates made of the ordinary fish-pole bamboo completed and carried out the general scheme. One curious little pavilion, that of Jehore, which actually consisted of nothing but a picket fence with a slightly more elaborate gate-way, had in the same manner caught the national spirit and by certain combinations of form and coloring become harmonious with the exhibit which it encloses.

A Louisiana molasses exhibitor had a very successful booth of sugar cane. The sugar cane was fastened to wooden forms, whose shape and outline followed the Egyptian style.

By far the most attractive pavilion in the building was that of Algeria. It simulated stucco and the characteristic blue and green tiles. It was in the form of a little cloister, around an open central court, in which was a small white fountain. The exterior walls at the four corners were blank walls, containing one small latticed window each, while Moorish arches opened both on the inside and out of the cloister, in the inside, quite to the ground of the court, but on the outside, only half-way down. The exterior of the pavilion was extremely plain while all the staff sculpture is reserved for the inner court. The severe whiteness of the outside was relieved by the introduction of the tiles above refered to, which were also plentifully used in the interior. Brass and colored-glass lanterns hung in the arches and the whole spirit of the place was decidedly Oriental.

Spain had a booth in the Agriculture Building which was more successful than any of her others. Without there being any especial reason for it, it was quite ecclesiastical in character, its *motif* being seemingly some old mediæval cloister, the tracery-work of the openings being filled with stained-glass.

Another excellent pavilion was that of Cochin China and some of the French colonies quite by itself in the southern part of the grounds. Here national characteristics were most successfully impressed upon the work, and made a successful pavilion quite in harmony with the exhibits which it held.

One very interesting exhibit was that made by the stained-glass firms of the various nations. When we look at the productions of Germany, England and France and then at our own, it is quite impossible for us not to imitate one of the notorious acts of "Sir Joseph Porter, K. C. B." for involuntarily we feel "our bosoms swell with pride." To compare the different schools and see wherein lie the qualities which lift our own work so much above that of other nations is very interesting. The chief point seems to be that our painted-glass is not painted in the sense that foreign glass is. Germany paints her figures, her draperies, her background, with the

most brilliant and often inharmonious of colors. France and England treat their glass in much the same way, while we simply paint in clear brilliant coloring the flesh-tints and hair, having stained-glass to fulfil the mission of background and drapery to a very great extent. The foreign treatment of glass would naturally lead to the result that all the material should be of equal surface and thickness, while in our stained-glass there is great diversity of surface as well as thickness which leads to much more artistic results. Turning back to the early Gothic work when the use of painted and colored glass reached such a high state of perfection, we have drawn our inspiration from that work and use the leads with much more boldness and greater artistic effect than do the other nations. There is in this one point great chance for difference of excellence in the use of the leads and among our own firms the results vary greatly. Of the work displayed at the Fair, Tiffany's was noticeably the most artistic produced. It is to be regretted that the exhibit of glass as actual works of art was not larger, as it could not have failed to be exceedingly interesting. It certainly would have proved attractive to a great many people if one might judge by the crowds that even in the early part of the Fair season filled to more than overflowing Tiffany's pavilion. There was quite an extensive exhibit of what would more properly be called glass-mosaics which though having much beauty in themselves could not come under the exact head of painted or stained glass. Tiffany was the only firm that gave its glass any artistic setting. The ecclesiastic glass either for windows or lamps was placed in a Romanesque chapel so perfect in its appointments that it was not an uncommon sight to see men remove their hats upon entering the "sacred" precincts. With the glass exhibit shown here the firm made a display of church-furnishings, giving up to the altar and chancel nearly half of the space of the chapel. The Byzantine glass-lamps exhibited were very effective, but there seemed so strong a tendency to draw inspiration from the mediæval work that one step more would carry the designs into the realms of the extreme and give an effect savoring of exaggeration and affectation, charming as this work at present is.

It is much to be regretted that J. & R. Lamb made no more elaborate display. There were a few pieces of their work exhibited in the Woman's Building among the designs made by women, that made one wish heartily there were more of such work to be seen.

The list of architects of buildings in the grounds who received medals is interesting although it is somewhat of a surprise to see such work was open to competition, and at the same time it seems a little incongruous to see the Columbian Exposition awarding prizes to its own salaried officers. Without knowing the exact basis upon which the awards were made, it is difficult to understand why some architects were so honored, but the list as published in the daily papers is as follows:

Daniel H. Burnham, a medal in recognition of his services as Director of Works.

Frank D. Millet, a medal for his services as Director of Decorations.

George B. Post received a medal for Manufactures Hall; Charles B. Atwood for his large buildings; McKim, Mead & White for the Agriculture Building, the New York State Building, the White Star Building and the *Puck* structure; Peabody & Stearns for Machinery Hall, the Massachusetts House and the Colonnade and Obelisk; Richard M. Hunt for the Administration Building; Henry Ives Cobb for the Fisheries; Jenney & Mundie for Horticultural Hall; Adler & Sullivan for the Transportation Building; S. S. Beman for the Mines and Mining and F. M. Whitehouse for Festival Hall; Van Brunt & Howe received a medal for the Electricity Building; Miss Sophia Hayden for the Woman's Building and F. L. Olmsted & Co. for the landscape-gardening work.

The architects of the following State buildings received recognition: Charles E. Frost for Indiana; Mortimer S. Smith & Sons for Michigan; J. Riely Gordon, Texas; A. Page Brown, California; H. T. E. Wendell, Colorado; Thomas Lonsdale, Pennsylvania; James W. McLaughlin, Ohio; Davis Laymon, Kansas; William Waters, Wisconsin; Cutter & Poetz, Idaho.

Besides these, medals were awarded to the Virginia Building, the Waukesha Mineral Spring Building of Van Brunt & Howe, the New York Central Railroad headquarters of L. Gilbert Bradford, the Pennsylvania Railway Building of Henry Bacon McKim, the Van Houten Chocolate House of F. S. Weber.

THE ARCHITECTURE OF CHICAGO.

A SPECIAL correspondent of the *Melbourne Argus* writes as follows: —

The Royal Institute of British Architects have recently conferred their gold medal on Mr. Hunt, who, though actually the architect of only one of the World's Fair buildings, is regarded as the representative architect of the Fair, and as generally responsible for it in its architectural aspect. Mr. Hunt is the first American who has ever received this distinction, for hitherto Americans have developed no original architectural genius, but have been content to copy, and for the most part to spoil in the copying, familiar types of European architecture. This servile imitation, without any regard to the fitness of things, is one of the main causes of the grotesque and discordant ugliness of American cities. A remarkable instance of this is the tower of the Madison Square Garden in New York, one of the most conspicuous buildings in the central part of that city. This is said to be an exact reproduction, measure for measure, of the Giralda of Seville. That statement is probably untrue, but undoubtedly the Madison Square tower is a pretty close imitation of the Giralda. Yet, what is the result? The Giralda, rising slenderly from a group of ancient buildings in perfect harmony with it, crowning the rocky scarf on the bank of the river, is one of the most beautiful structures ever reared by man. The Madison Square Tower, standing out of a quadrangular block of circuses and theatres and beer-gardens, right on the pavement of a shabby quarter of a modern town, and dwarfed on all sides by enormous piles of vulgar apartment-houses and still more vulgar office-buildings, only attracts attention by its oddity. It is utterly incongruous and meaningless, and neither has any beauty of its own nor adds any beauty to a totally unbeautiful locality. The average American architect cannot understand how that can be, and he gets angry with any one who says it is so. He argues very simply: "The Giralda of Seville is admitted to be surpassingly beautiful. Our tower is exactly like the Giralda of Seville. Therefore our tower must be surpassingly beautiful." This is very funny. . . .

The dear old sleepy southern towns or New England villages, which never move with the times, have their own old-fashioned architecture, which at least is simple and suitable and free from vulgarity because void of all affectation. They know nothing of the new iniquities. . . .

This custom of making Chinese copies prevails as much in details as in general design. Many American architects, when they go to Europe, spend their time "picking up details," as they call it; that is, getting photographs or drawings of windows and doors and cornices and entablatures, and even grilles and lamps and knockers, and any other minor features in stone or terra-cotta or iron. These they reproduce here, and clap on to buildings of their own designing or stolen from others, without the smallest consideration for appropriateness. Thus, in the long, gloomy, unpicturesque streets of New York, or the narrow, untidy by-ways of Philadelphia, one is often struck by some bit of stone or metal-work that recalls Antwerp or Brussels, or Florence or Rouen, or more often, perhaps, some quiet little town in Holland. . . .

Chicago is notoriously the worst sinner of all in this respect, for there is here a blatant defiance of all rules of art and a colossal vulgarity in outward show which make even the Eastern Americans shudder, and furnish an unfailing theme for the comic papers. Bigness and expensiveness form the only standard. Twenty stories high and costing millions of dollars — that is the idea for street architecture; mere walls with holes cut in them for windows, and as much marble and onyx and silver and glass as can be made to stick on to them inside. As for private houses, the miles and miles of truly gorgeous structures in which the millionnaire pork-packers and grain speculators and dry-goods dealers luxuriate, are enough to drive an architect with any respect for his art to drink or suicide. I suppose there is no other spot on the surface of the globe where so much bad taste is displayed to the square mile. The Mediæval castle, with battlements and turrets, seems to be the peculiar vanity of the pork-packers, while the dry-goods men's fancy runs rather to the Doge's Palace at Venice, and the saloon-keepers and gambling-men like something light and airy and Frenchy, so to speak, with a sort of Tuileries touch about it. The gaudiness and queerness of the materials is not easy to describe. Stones of all colors, white, black, gray, pink, yellow, green, blue, red, and all these in combination, are seen everywhere. Then there is a particularly hideous kind of stone that is much in vogue, which has a white or light gray ground, with black petroleum oozing from it in patches or blotches, suggesting defective drainage or some such nastiness. This is considered very tasty and high-toned. In addition to these, bricks and terra-cotta of every shade and every kind of mottle are freely used, either alone or in combination with "rock," as building stone is called here. Some of the effects thus produced are curiously gruesome, and the impression formed by driving through seven or eight miles of such edifices must be experienced in order to be realized.

All this being so, it is no wonder the conferring of the highest architectural distinction in the world on a Western [*sic*] American has created a profound sensation, especially as the President of the Royal Institute, in conveying the Gold Medal to Mr. Hunt, emphatically and specifically commended the World's Fair architecture, which he declared marked a new era in the history of the art. He did not hesitate, in fact, to place Mr. Hunt in the front rank of architectural genius, or to class the works now to be seen on the shore of Lake Michigan among the grandest creations of this or any age.

The people here are uproariously jubilant over this, which they vaunt as a complete and final answer to the strictures of envious Eastern critics or prejudiced visitors from abroad. Of course it is not a final answer. Many of the greatest architects living totally deny and repudiate the authority of the Royal Institute, and some of them protest that to receive a distinction at its hand is a sure mark of a man of low degree in art. A writer of great force in one of the leading English magazines roundly accuses the Royal Institute of degrading architecture from an art to a trade by its persistent practice of rewarding shoppiness and cheap decorativeness in design, whilst ignoring every development of high originality or purely artistic genius. The same writer disposes of the World's Fair architecture in one indignant phrase, as "a preposterous piece of nonsense" not worthy of the name of architecture at all. When there

are such diametrical differences among those who ought to know all about it, perhaps an impartial, if uninstructed, observer may be allowed to offer an independent opinion.

My opinion is this. Any sweeping judgment on the World's Fair architecture, or any judgment formed from pictures or from a single visit is bound to be a wrong one, whether favorable or unfavorable. The World's Fair buildings have no parallel and no precedent. They are entirely different from anything ever seen before, and they cannot with any justice or right reason be considered from the same standpoint as buildings designed for a wholly different purpose and under wholly different circumstances. No Roman emperor in the wildest flights of the building fever ever dreamt of spending nearly four millions sterling upon a group of palaces that were only to stand for six months and were then to be torn down and sold for rubbish. That is really the whole point. The question is not whether the World's Fair buildings are fine models of architecture compared with the great permanent monuments of old countries, but whether they are fine models of architecture regarded as exhibition buildings, begun and finished within eighteen months, and so constructed as to be capable of removal within a few weeks after they shall have served their purpose. Viewed in that light — and it is obviously the only fair light in which to view them — they must surely be considered as marking a great advance in this particular kind of architecture at all events. What is more, as has been well pointed out by some of the papers here, there are millions of people to whose mind the very conception of architecture has hitherto been impossible, but to whom the existence of such an art will now for the first time be manifested in a very striking and instructive way. It is not too much to say, I think, that among the final results of this gigantic enterprise the greatest will be its influence on the future of American architecture.

My own feeling about it is that the buildings vary from a very high order of merit to a very low one, and that the best of them, and not the worst, are the most likely to impress the minds of those who see them and frequent them daily. Two of them are so good that either would constitute a notable ornament to any city in the world. These are the Agriculture Building and the Fine Arts Building. Each stands on the quay of a broad sheet of water, with the whole unbroken façade visible from the opposite shore, and the best advantage has been taken of this situation by bold treatment and the use of large columns and other principal features. Of the two the Fine Arts Building is the more pleasing to me, and I fancy, to most other uninstructed persons. Viewed across the water from the rear of the Illinois Building it is wonderfully beautiful and stately, and seems to present nothing but refreshment and contentment to the eyes. It is quite curious to observe the effect it has on unsophisticated spectators when they suddenly come in full sight of it in the course of their wanderings. It is common to see a whole group of people stop suddenly and give a simultaneous exclamation of surprise and pleasure, and there is always quite a crowd of men, women and children sitting on the shady side of the Illinois Building, merely gazing at the lovely structure opposite, and feeling perfectly happy, not knowing why. If that is not a sign of good architecture I do not know what is. Architects and artists, nevertheless, tell me that the Agriculture Building is the finest in the Fair, and I dare say they are right. It resembles the Fine Arts in general outline, but has more detail and is more directly suggestive of its purpose. It has the advantage, too, of presenting two elevations to points-of-view across the water, each of which is exceedingly handsome. The groups of sculpture, which are a decided feature of the Agriculture Building, though almost colossal, are in just proportion and strikingly true to nature.

I cannot imagine what the critics expect, or what sort of buildings would satisfy them, if they object to either of these. The Grecian peristyle, which extends along the water from the Manufactures and Liberal Arts to the Agriculture, and is one of the most unexpected features of the Fair, has been very severely criticised, mainly, it seems, on the ground that the statuary is over-sized and grotesque. There is truth in that, when the peristyle is viewed from the back at close quarters. But that is just where it is not intended to be viewed from. It is in reality the screen of the main entrance to the Fair from the Lake and viewed from its proper place, namely, the deck of a steamer or a yacht approaching the landing-stage, it is unquestionably the most picturesque water-gate in existence. The statues are diminished and refined by distance, while the columns are elongated by reflection, with a result that at any rate has given a keen sensation of joyful surprise to multitudes of worthy folks who don't know a peristyle from a pagoda.

The stupendous hall of Manufactures and Liberal Arts is simply a glorified exhibition building without any pretention to fine architecture. It is not so beautiful as the Crystal Palace, but it is a great deal more serviceable and it has beauty enough and to spare in its unequalled spring of arch, its magnificent distances affording never-failing relief to tired eyes, and its strange effect of lightness and comfort combined with strength. The Administration Building is something like a four-square front of the Grand Opera at Paris, considerably elevated as to the columns and dome and thrown into really fine relief by the terrace and fountains in front. The interior with a clear overhead space of 276 feet, is imposing and grows greatly upon you after a while. Many Americans, possibly the majority, consider the Administration Building the noblest of all; but I must say myself I think the architect might easily have made the exterior handsomer and more harmonious without sacrificing his main object, namely, to furnish the whole group of buildings with a crowning dome, visible for many miles and especially effective when lighted up at night.

All the other main buildings belong more or less distinctly to the exhibition order of architecture, and one or two of them are almost aggressively ugly, for the very reason that they try to pass themselves off for something which they are not. The Transportation Building is the worst of all, and a doubt may well be held whether it has not purposely been made as hideous as possible in order to be a foil to the others. It is really nothing but a shed — large, spacious and well-lit, as it ought to be; but the architect has tried to make it present externally some new and original type of architecture, with a result that can only be described as a nightmare of bad taste and wasted ingenuity. It is painted dark red, with scrolls and twirligigs in all sorts of other colors, and this *bizarre* effect is aggravated instead of relieved by huge figures of flat and lanky females with wings, plastered on the walls at regular intervals, all exactly alike, as if done with a stencil-plate, and each bearing in her pallid hands a tablet inscribed with the name of somebody or other, who is supposed to have furthered the arts of transportation. The entrance consists of an enormously heavy archway, surmounted by a kind of slab or cap, the object of which is a mystery; the whole arabesqued in a bewildering pattern, and entirely covered with very brassy-looking silver. I have never met anybody who could explain what it all means, or how such a sanguinary-looking blot was allowed to be placed on the White City. I believe it is a piece of native Chicago talent; but every Chicago man I have ever spoken to about it either laughs at it or swears at it, so there is reason to hope it by no means represents the Western-American architecture of the future. Luckily, it is not very conspicuous, and nothing but wilful malice could make any one condemn the whole World's Fair on account of that one shocking example of what American architecture ought not to be.

As a thorough-going Britisher, and a lover of art in any enjoyable form, I vote that Mr. Hunt is well entitled to his gold medal, and that the Royal Institute have shown right judgment as well as a liberal mind in awarding it to him. I may be a Philistine, but, if so, I am in very numerous and respectable company.

INTRODUCTION OF BUILDING SPECIALITIES.

THE prejudice against any new invention or appliance is to be attributed mainly to use and habit. To instance a common door fastening: people from their earliest years are accustomed to a certain kind of lock or fastening. Sight and tactical experience become early habituated to a certain method of opening of a door by lifting a latch or turning a handle or knob, the very touch or movement of the hand becomes a habit, and any new mode imposes a labor. Those, for instance, who have been long in the habit of opening a door one way, find it hard to substitute a pull for a push. In banks and public offices, the usual swing-doors are convenient, as they allow either method to be adopted in opening. A person can pull the door towards him on going out, or push it outwards; but the substitution of certain kinds of spring-hinges has led to the alteration of the mode of opening, the door being drawn or pulled towards one when leaving the building or apartment, a stop preventing the door being pushed out. This alteration has been found necessary when the door is hung between a room and a corridor through which people are continually passing, as a door pushed suddenly out would be liable to cause personal inconvenience and injury to those walking along the outer corridor, and some unfortunate knocks on the head or scalp-wounds might be inflicted. But the change in opening is not so easily taken to. Persons in the habit of opening such a door by a push become vexed when they find their effort has been fruitless, and the alternative pull becomes a trouble. The same vexation is experienced when the usual bell-pull has been replaced by a button to be pressed, as in the case of a pneumatic or electric bell; or when a lever to be pressed down or lifted takes the place of the ordinary knob or handle on a shop or railway-carriage door. A certain amount of irritation is experienced when we encounter resistance to our usual habits. These sudden changes in our door furniture are aggravating, especially to elderly people, and hence the prejudice against the substitution of new and untried inventions. We must remember also that in such things as door furniture, window fastenings and openings, locks and bolts, and of all domestic appliances, we have to consider the strong conservative prejudices of women. Both the lady of a house and her servants have to be instructed in the use and management of these fittings, and we know that any complicated contrivance like a bolt or a new sash window will puzzle a woman-servant and become inoperative in consequence. Anything mechanical or a little difficult to handle will be neglected. Habit, in fact, is so deeply rooted, that it takes a long time to rid ourselves of any old methods and tastes, a fact which the architect knows better than most men, and for this reason he is inclined to look rather suspiciously at many new inventions in building that are brought to his notice. The architect has first to study and consider the idiosyncrasies and tastes of his client, his convenience and comfort, and he knows how unwise it will be to introduce new fittings in a house to be occupied

by people who have certain prejudices. It takes a long time to eradicate them, or to prove that a certain type of fastening, for instance, is clumsy and imperfect in its action. How tenaciously the ordinary householder, for example, clings to the old sash-fastener, with all its defects and its unscientific construction. No invention for securing two vertical sliding sashes can be more defective in all the requirements. The resistance it offers to a forcible raising of the lower sash is ludicrously small, because the lever sustains not a direct but a cross strain, and any thief or burglar would laugh at it. Yet how seldom any improved fastening is seen. The old one is cheap, is more popular, and for these reasons the builder and architect continue to specify it. We may take as another instance the double-hung sash window. It has been in use for nearly three hundred years, and although its rival, the French casement, has occasionally "run it hard," it still maintains its position as the popular English mode of opening windows. The history of this invention is rather obscure: at first the under sash was kept at various heights by a series of notches and a catch; the Dutch subsequently introduced the suspension of the sash by a weight and line over a pulley, and one example is found as early as James I, in Wickhan Court, Kent. But the double or sash window, as we see it, was not generally introduced till the time of William III. The sash window, at any rate, was introduced in England in the 17th century. "Shas frames and shas lights" are spoken of in Moxon's "*Mechanick Exercises*" (1700) since which time they have continued to be used, in spite of many ingenious attempts to improve upon them. During the last 20 years numerous patents have been taken out for hanging sashes in such a manner that they may be easily removed from the frames for cleaning, and to prevent accident. A few of these inventions are particularly ingenious: one kind allows of the sashes being hinged or pivoted, that they may be pulled inwards for cleaning without disarranging the lines and weights, or removing the inside beads. Many sash pockets and fittings have also been invented, but it shows the strong conservative feeling existing among the building fraternity and the public, that these improvements, as some of them undoubtedly are, should be so slow in supplanting the old arrangements. How slow, too, has been the introduction of new forms of closing and rendering weather-tight the French casement. The market is full of patented meeting-stiles, water-bars for the sill and bottom rails, bolts for closing the casements, many of them improvements on the old grooves and beads, but architects still specify the old forms and the well-known espagnolette bolt.

In connection with window opening we may refer to the many kinds of fanlight and skylight opener on the single-lever principle, all operated by one movement of the hand, which are, despite prejudice, coming into general use; but in this and similar cases the action of the appliance is so obvious, that the most prejudiced stickler for old methods would not hold out. Whenever the invention saves labor, the prejudice of habit soon disappears, and it is this merit of simplicity which has done more to make a new thing popular than anything else except, perhaps, cheapness.

The other day we had the opportunity of inspecting a new and improved roofing-tile, a German invention, which is certainly a step in advance of the old-fashioned method of hanging tiles by pegs to laths or battens, the jointing being on the interlocking system which does away with all pointing of lime and hair mortar, and the material, too — a compressed cement — is harder and less porous than the old clay-burnt tile. The question is, Will the new system of hanging supplant the old system? The best-known ordinary tiles, such as the Broseley, were some time in the market before they came into general use, and many kinds of ribbed and special tiles are still almost unknown to the ordinary builder. The same shyness is manifested in horticultural glazing, although such excellent systems of glass roofing, with patent bars and caps, are in the market. Only after many proofs of the undeniable advantages of wood-block flooring has it come into general use. The hard and cold stone, tile, and brick or cement, or the ordinary boarded floor were for a long time used, in spite of their defects, for almost all basements and school floors, and it is only the superiority of such wood-block systems that has compelled architects and others to introduce them. The invention of "metal lathing" has been long before architects, yet still we find specifications providing the old fir laths for buildings and positions in which a more durable and fire-resisting substitute is called for. But we may go through the whole range of the building trades, pointing the same lesson and moral. How hard it is for an inventor or the maker of a new material or appliance to introduce it! With what pertinacity the public cling to the old methods, because they will not take the trouble to learn to understand what they regard as a complicated and new fangled arrangement; because they are more familiar with the existing goods; and lastly, because those now used are thought to be less expensive.

There is another reason why patentees and introducers of novelties are so handicapped — namely, the disinclination of manufacturers and the trade to take up anything new. The reasons why they set their faces against any new invention or appliance are not far to seek. In the first place, they think it will not "take"; that if they purchased the patent-rights of, say, a new fastening, they would have to spend a small capital to advertise, or to bring it before the public or the profession, whom they know are very conservative and slow to make changes. Secondly, a manufacturer has his own goods to sell; and it is not very probable that, with a large stock of the ordinary goods which suits builders and the public, and with plant and machinery for turning them out, he will be willing to risk an outlay of capital on new plant. A new sanitary appliance, say a trap or a closet, would entail in this manner an expenditure that could scarcely be justified till the invention had been tried and found successful. A new door or window fastening would be subject to the same difficulties and disinclination on the part of the manufacturer. We have seen many clever and excellent inventions in this way lost to the public because the patentee failed to obtain the support of a large ironmonger, or had tried to introduce his patent single-handed. The architect, to a very great degree, is a creature of circumstances. He feels rather shy of specifying a new fastening or a new stove or trap unless he has had proof of its operation, although he may have a very high opinion of the value of the invention. Some things which approve themselves directly to his judgment are found not to bear the test of actual use, owing, it may be, to some element of use that has not been apprehended by him. In selecting his fittings, ironmongery, and brasswork, he is more likely to consult the advertisements in our columns of well-known manufacturers, than adopt any independent views he may have formed. Such a course is at least safe, and it gives him less trouble, although the progress of building invention suffers thereby. The American "building exchanges" have to some extent supplied a means of bringing new inventions before the profession; but they do not carry the weight of independent criticism, such as that of unbiased professional journals, and, so far, similar attempts here have not been attended by any great success. — *Building News.*

SOCIETIES

SKETCH-CLUB OF NEW YORK.

THE regular November dinner and meeting of the Club were held in the new room, 1473 Broadway, on the evening of Saturday the 4th inst. In spite of the very disagreeable weather there was a large attendance and the meeting was of unusual interest. The guest of the evening was Mr. Hughson Hawley, who after the dinner addressed the Club on the subject of rendering architectural perspective in water-color, illustrating his remarks by making a sketch. After putting on the general first wash and a few shadows to show the principles he advocated, he cut from the stretcher the sketch he had been making, and showed beneath a finished water-color of the same subject, which he presented to the club. Mr. Hawley commanded the attention of the members and at the conclusion of his address was enthusiastically elected an honorary member of the Club.

Some drawings were handed in for the competition on artistic rendering from a poetical quotation, and a criticism by Mr. James Renwick was read on the design for a Gothic rose-window, the last month's competition. Second mention was awarded N. Hauseman and third to H. H. Braun. The author of the design placed first was not known at this meeting.

It was announced that a prize of $25.00 would be offered in a competition for an advertisement for the Chicago Varnish Co., the advertisement to appear in the catalogue of the Architectural League Exhibition and the competition to be judged by members of the League.

Classes in water-color and pen-and-ink drawing will begin this month, the first class-night being the 10th inst.

EDGAR A. JOSSELYN, *Recording Secretary.*

T-SQUARE CLUB OF PHILADELPHIA.

A MEETING of the T-square Club of Philadelphia was held at the club-rooms, Wednesday evening, November 1st.

The subject for competition was "A Cover for the Sketch-book." Messrs. Henry Thouron, Wilson Eyre, Jr. and Wm. F. Gray had been invited by the club to lead the criticisms on the designs submitted, of which there were twenty-eight. First mention was awarded to Charles Z. Klauder, second to Anthony P. Valentine and third to John Molitor.

The subject for the next competition was announced as "A Country-house in the Colonial style." Required drawings: front elevation and one side elevation at one-fourth-inch scale. Elevations to be rendered in color, with shadows cast. Sketch-plan of first-floor at one-eighth-inch scale.

GEO. BISPHAM PAGE, *Secretary.*

THE ARCHITECTURAL CLUB.

THE adjourned annual meeting of the Architectural Club was held at the club-rooms, 5 Tremont Place, this week. The main object of the meeting was to change the constitution so as to put responsibility more with the Club, and not so much with the officers. This change was made harmoniously. These officers were elected:

President, R. D. Andrews; *Vice-President*, R. C. Sturgis; *Treasurer*, Harry F. Gibbs; *Directors*, H. Magonigle, E. F. Maher (all for two years); *Secretary*, J. H. Jones; *Directors*, A. G. Everett, A. H. Bowditch, E. C. Eastman (for one year).

ILLUSTRATIONS

[*Contributors of drawings are requested to send also plans and a full and adequate description of the buildings, including a statement of cost.*]

THE AGRICULTURE BUILDING, MESSRS. MCKIM, MEAD & WHITE, ARCHITECTS, NEW YORK, N. Y. AND THE COLUMBIAN FOUNTAIN, MR. FREDERICK MACMONNIES, SCULPTOR, WORLD'S FAIR, CHICAGO, ILL.

[Gelatine Print issued with the International and Imperial Editions only.]

HOUSE OF CHARLES M. HEMENWAY, SOMERVILLE, MASS. MR. SAMUEL D. KELLEY, ARCHITECT, BOSTON, MASS.

NEW YORK LIFE INSURANCE COMPANY'S BUILDING, NORTHEAST CORNER LA SALLE AND MONROE STREETS, CHICAGO, ILL. MESSRS. W. L. B. JENNEY & W. B. MUNDIE, ARCHITECTS, CHICAGO, ILL.

DESCRIPTION. — The dimensions are 80 feet on La Salle Street and 141 feet on Monroe Street. The building is twelve stories in height. The first, second and third stories are of dressed granite. Above the third story the building is faced with terra-cotta. The alley and court are faced with white enamelled brick.

The basement has a rentable area of 7,000 square feet, being the entire frontage on La Salle Street, and two-thirds of the frontage on Monroe Street, with entrance on Monroe Street. The balance of the basement is devoted to the working-department, boilers, pumps, elevator-machinery, ventilating machinery and electric-light plant.

The first story, or ground-floor, has a central entrance on both streets into the stairway and elevator halls. The passenger-elevators are five in number, and are located near the centre of the building. The freight-elevator is located on the alley and will run from basement to attic.

On the first-floor are three fine offices suitable for banks or insurance companies.

The second story is designed specially for banking purposes, and is arranged for one, for two, or for three banks, as may be determined later.

The third to twelfth stories are arranged for offices.

In two of the stories one or two of the rooms, having court-fronts only, will be devoted to barber-shops and toilets.

The bank floor will be finished in mahogany; the other floors in oak. The entrance-ways and halls on ground-floor will be paved with handsome mosaic. The other halls with marble. In first and second stories, the entire hall finish, including walls, ceiling and staircase, is of marble.

The work is being pushed very rapidly, and the building will be ready for tenants in April, 1894.

Estimated cost, $800,000.

The construction is what is termed "Steel Skeleton" or the "Chicago Construction" in which all the loads of exterior walls, of interior walls and partitions, and of floors, are carried independently, story by story, on the columns. The columns are of riveted steel and the work at the building is all assembled with hot rivets. All steel is carefully protected by masonry or other fireproofing. The wind-pressure is carefully calculated and provided for, so that the building may be considered as reasonably protected against fire, cyclones, or earthquakes.

Work on the foundations of this building was begun July 19th, and the steel-work was completed October 3d, together with two stories of granite, three stories of terra-cotta and the fireproof arches laid in four floors.

This style of construction was first introduced in the Home Insurance Building, Chicago, in 1884, W. L. B. Jenney, architect.

Steel Frame.

In making a description of the steel frame of the New York Life Insurance Company Building, we will first speak of the loads, which occur, and then of the steel frame, which resists these loads.

The loads may be classed as follows:

Dead-loads. — Weight of floors, sidewalks and alley pavements. Partitions. Curtain walls, cornice, glass and mullions. Piers. Miscellaneous loads — vaults, tanks, marble ceilings, etc.

Live-loads. — Live-loads on floors, sidewalk and alley pavement. Snow-load on roof. Elevator-loads. Wind-pressure.

Weight of Floors in Detail.

First Floor. —	12″ tile arch	50 lbs. per sq. ft.
	Concrete	31 " " " "
	12″ — 32 lbs. I-beam	8 " " " "
	Mosaic floor	15 " " " "
	Plaster	6 " " " "
		110 lbs.

In same manner weight of second to thirteenth floors inclusive, was found to be 90 pounds per square foot; weight of roof, 70 pounds per square foot; sidewalk, 140 pounds per square foot and alley pavement, 190 pounds.

The weight of the partition was added to the dead floor-load at 20 pounds per square foot of floor area.

The reactions of vaults, tanks, etc., were calculated for each case. The weights of curtain-walls, piers and mullions were computed per lineal foot from the wall sections.

Live-loads.

Live-load on floor-beams in first floor taken at	125 lbs. per sq. ft.
" " girders " " " "	110 " " " "
" " floor-beams, second to thirteenth floor inclusive	70 " " " "
" " girders, second to thirteenth floor inclusive	60 " " " "
" " floor-beams, roof	40 " " " "
" " girders, roof	40 " " " "
" " floor-beams, sidewalk and alley pavement	200 " " " "
" " girders, sidewalk and alley pavement.	180 " " " "

The following table will show how live-loads were taken on columns:

Story in which column is located.	Live-load on column from floor above.	Total live-load on column.	Floor can be loaded up to.
Attic	40 lbs. per sq. ft.	40 lbs. per sq. ft.	15 lbs. per sq. ft.
Twelfth	50 " " " "	90 " " " "	15 " " " "
Eleventh	35 " " " "	125 " " " "	15 " " " "
Tenth	25 " " " "	150 " " " "	15 " " " "
Ninth	20 " " " "	170 " " " "	15 " " " "
Eighth	15 " " " "	185 " " " "	15 " " " "
Seventh	10 " " " "	195 " " " "	15 " " " "
Sixth	10 " " " "	205 " " " "	15 " " " "
Fifth	5 " " " "	210 " " " "	15 " " " "
Fourth	5 " " " "	215 " " " "	15 " " " "
Third	5 " " " "	220 " " " "	15 " " " "
Second	0 " " " "	220 " " " "	15 " " " "
First	0 " " " "	220 " " " "	15 " " " "
Basement	100 " " " "	320 " " " "	100 " " " "

The snow-load was taken at 40 pounds per square foot.

The wind-load was taken at 30 pounds per square foot on exposed vertical surface of building.

In taking live-loads of elevators, double the maximum load was taken to allow for sudden shocks.

The building being built on compressible soil, that with a load of 3,500 pounds per square foot will compress at least 3 inches, it becomes necessary to determine the dead-loads quite accurately to secure uniform unit-loads and hence equal settlements. As the live-load is small in comparison to the dead-load, during the period of construction when most of the settlement takes place, it is disregarded in determining the base area of a footing, but it is considered in calculating the strength of the footing.

Note the reduction of live-load from beams to girders and the graduated reduction of live-load on the columns from top to bottom. These reductions are made on logical assumptions and from motives of economy.

To return to the settlement, the building is set 4½ inches above its normal grade. The greater part of the settlement 2½ to 3 inches will be obtained by the time the building is ready for occupancy. After that the settlement may amount to one inch (1″) in the next twelve months and will then cease as long as load is quiescent.

The Frame.

The following parts may be considered:

Beams. — Carrying floor-arches, curtain-walls, cornices, mullions and in part piers.

Girders. — Carrying beams, curtain-walls, cornices, etc.

Columns. — Carrying beams and girders, and piers directly.

Cast-iron Stools. — Carrying the basement-columns, and

Foundation-beams. — Which ultimately transmit all the loads to the ground.

The columns are spaced, with some exceptions, 15′ 5½″ between centres. The sizes of beams and girders in the different floors were found to be as follows:

	Beams.	Girders.
First floor	12″ — 32 lbs. I-beams.	15″ — 41 to 80 lbs. I-beams.
Second to thirteenth floor inclusive	10″ — 25½ " "	15″ — 41 to 50 " "
Roof	8″ — 18 " "	12″ — 32 " "

The exceptions to the above are such other sizes as were required by the special framing around elevator-openings, stair-well holes and valleys formed by the slopes of the roof.

Special beams and girders are provided to carry the curtain-walls, cornice and party-wall, their number and size depending on the shape and weight of the former. In a number of cases it has been necessary to use girders built of plates and angles.

Columns. — The columns used are built up of two channels connected either by side-plates or by lattice-bars. Ten-inch channels have been used in all cases, the various necessary cross-section areas being obtained by the different weights of the channels and the different thicknesses of side-plates, or the substitution of lattice bars. The interior columns have side-plates 12 inches in width. The exterior columns have side-plates 21 inches in width and the columns are placed with the longer axis parallel to the face of the building. The columns generally are continuous through one story only, the top of each column ending in a horizontal top-plate of $\frac{3}{4}$-inch steel which is riveted to column by horizontal angles, and on which the column above rests, the upper column being connected to lower by horizontal angles. In the case of an exterior column the top-plate is generally larger and of special shape to carry at each story the piers that surround the column. As an exception to this, the granite piers carry themselves and the curtain-walls from the foundations, up to the third floor line. Let it be remarked here that what we are calling the first floor is what is often known as the ground-floor.

The basement columns rest on cast-iron stools 12 inches high and with a base 3′ 0″ × 3′ 0″. The shape of the stool has been designed to develop the required strength with as little metal as practicable. The top of the stool is planed and to it is bolted the column which ends in a $\frac{3}{4}$ inch base-plate.

The arrangement of the foundation beams (including the stool) in every case is designed to resist in an economical and safe manner the bending-moments and shears that are produced in transferring the load from the column to the ground; from an intensity of 13,000 pounds per square inch to one of 3,500 per square foot.

The beams and girders are generally connected to the columns by resting on the top plates of the latter and being riveted to the column through the ends of the flanges. The beams are connected to the girders by means of vertical angles riveted to the webs.

Wind-pressure and wind-bracing. — The action of the wind on the building was assumed to be the action of a uniform force of 30 pounds per square foot acting on the whole of any one side, above the fifth-floor line; this line being at the average height of the surrounding buildings. The bending-moments and shears resulting from this action are resisted

First. — By the rigid connections especially designed, between the outside columns, and the beams and channels between them, and by these channels, beams and columns themselves, and by the party-wall to which the steel frame is connected.

Second. — By the general rigid connections between all the columns and the beams attached to them.

Third. — By the partitions, piers and floor arches, the partitions and piers taking up a percentage of the shear and the stiff floor system distributing the shear at that plane over the column system below it.

At every joint formed by the outside columns and beams the bending-moment from wind action was carefully computed, and the connection, beams and column, designed accordingly. As a matter of course the maximum resultant action of dead, live and wind loads, was considered.

The special connections of outside columns and beams were designed to resist entire wind-pressure at 30 pounds per square foot. Any excess would be taken up by items two and three.

MAIN STAIRCASE OF THE SAME.

THE *Brooklyn Eagle* BUILDING, BROOKLYN, N. Y. MR. GEORGE L. MORSE, ARCHITECT, BROOKLYN, N. Y.

THREE stories are rented for offices, the remainder of the building is occupied by the Brooklyn *Daily Eagle* establishment. It is thoroughly fireproof. The material of the exterior is Long Meadow Kibby stone, Perth Amboy brick and terra-cotta. Cost $325,000.

[Additional Illustrations in the International Edition.]

THE COLONNADE BETWEEN THE AGRICULTURE AND MACHINERY BUILDINGS, WORLD'S FAIR, CHICAGO, ILL. MESSRS. PEABODY & STEARNS, ARCHITECTS, BOSTON, MASS.

[Gelatine Print.]

A HOUSE AT EPINAL, FRANCE. MR. J. BOUSSARD, ARCHITECT.

[Copper-plate Engraving.]

THE key-note of this structure is found in the architect's appreciation of the old Roman and Gallo-Roman method of at the same time excluding from the dwelling-house all injurious exhalations from the building site and warming the whole structure in an even and equal degree. To this end the lower story is carried on a tile floor laid upon brick vaulting, supported on piers, and the space below is used as a heating and ventilating chamber, the current being set up by natural draught; this space has an average height of about one metre. The rooms of the ground-floor are about sixteen feet in the clear and are treated in the Pompeian manner so as to bring everything into harmony with certain doors and other fixtures which until recently formed parts of the famous Pompeian house of Prince Napoleon which was built in the Avenue Montaigne some thirty years ago after the design of M. Normand. The exterior of this building is of stone and the entire building will cost about $30,000.

LONGITUDINAL SECTION OF THE SAME.

[Copper-plate Engraving.]

J. & C. SIMONDS & CO.'S BANK BUILDINGS, READING, ENG. MR. G. W. WEBB AND MR. W. GALT MILLAR, ARCHITECTS.

PRINCIPAL DOORWAY OF THE SAME.

WE publish this week two illustrations showing the alteration and extension of the banking premises of Messrs. Simonds, in King St., Reading. The whole of the western half of the old bank has been demolished, and the façade made to harmonize with the other portions, besides being raised. The work presented great difficulties to the architects and contractors, but all have been successfully overcome. Entering from King St., there is on the right a spacious telling-room, with every accommodation for the public, on the left being two large offices for the use of the partners. Over, are floors fitted up for the various requirements of a bank and for a manager's residence, and in the basement is a series of safes. The entrance from the market-place has been retained and improved. A lift runs from the basement to the top story; every floor is fireproof; the heating throughout is by hot water; there is a very complete series of speaking-tubes and throughout a most valuable and interesting feature is the combined electric-light and gas-fitting.

THE NEW ENGLISH PRESBYTERIAN CHURCH, ALEXANDRA ROAD, SWANSEA, ENG. MR. T. G. WILLIAMS, ARCHITECT, LIVERPOOL, ENG.

THE new English Presbyterian Church at Swansea is just completed, at a cost of nearly £3,000. The church is approached by vestibules and porches leading to Alexandra Road. The pewings on the ground-floor are arranged in circular form, having a radius taken from the pulpit. The ground-floor with the gallery has accommodation for 650 to 700 persons. All the joinery is in pitch-pine varnished. The windows are glazed with glass of various tints. The walls are built of local stone with Bath-stone dressings. The church contains an organ-chamber, spacious vestry and classrooms and conveniences, and adjoins a large schoolroom, which was previously built. The main feature is the façade fronting Alexandra Road, which has a square tower about seventy feet high, and the tracery windows in the gable, which are in Bath stone.

NEW OFFICES AT FARNLEY, ENG., FOR THE FARNLEY IRON COMPANY.

COMMUNICATIONS

[*The editors cannot pay attention to demands of correspondents who forget to give their names and addresses as guaranty of good faith; nor do they hold themselves responsible for opinions expressed by their correspondents.*]

THE MERCHANT TAILORS' BUILDING: A CORRECTION.

NEW YORK, N. Y., November 6, 1893.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Very much to my surprise I find in your last issue of the *American Architect* a photo. print of the Merchant Tailors' Building in the exposition grounds accredited to Mr. C. B. Atwood.

This building was designed by myself and I know it is only necessary for me to call your attention to the error in order to have it corrected in the fullest manner.

Very truly yours, S. S. BEMAN.

[WE regret sincerely the mistake our correspondent brings to light, and will say in palliation of it that we had no reason for doubting the reliability of the two informants who told us that the building had been designed by Mr. Atwood. We hope the subscribers to the International edition will at once turn to our issue of last week and make the correction upon the plate itself. — EDS. AMERICAN ARCHITECT.]

"A DISPUTE WITH A CHURCH BUILDING-COMMITTEE."

October 30, 1893.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Your advice as per to-day's issue, I most thoroughly appreciate. In reference to my resignation, I might say that as there is no contract between us, I having been employed as their architect, I can see no reason why they could not discharge me if they so desired at any time, or I refuse to continue to serve them if the circumstances warranted such action on the part of either of us.

That they had the absolute right to do with theirs as they choose, I at no time had the slightest doubt, but I should certainly think

that there was some redress for an architect, when a client so alters his work, architecturally, as to injure his reputation.

Had the committee stood loyally by me no trouble would have arisen, but you can readily understand how natural it would be for them to be led by the advice, and influenced by the remarks and opinions of the builder, who is at the same time one of the Board. The grounds for his emphatic prejudice was my disposition to have the work done at as low a cost as possible, which I have no doubt seriously affected his profits.

Since my letter of October 9, the work to be done by a portion of the masonry in this building, was so exaggerated as to lead one of the building inspectors to condemn it, and although I have been unable to find either engineer or practical builder who has not sustained me beyond question as to the accuracy of my work, this wall was taken down and a new one of much greater thickness erected, without notifying me of the inspector's action, or even giving me an opportunity to explain myself, and when I find such disposition on the part of clients (this builder being one) I can see no reason why I should not resign, it being clearly evident, the more trouble and annoyance given me, the better. Its purpose being to establish an excuse for not paying the balance of my bill.

Yours truly, Transept.

NOTES AND CLIPPINGS

A Rival to Oak. — The representative of a well-known firm of builders informs me that he believes that he has hit upon a discovery in a Borneo wood called "bilian." It has a very close grain, and in appearance is not unlike ebony, more especially after exposure to the air. Its main virtue, however, consists in its breaking strain, which is greater even than that of English oak. Moreover, "bilian" is not a particularly heavy wood, since it only weighs sixty pounds per cubic foot against the eighty pounds of boxwood. Further, it seems remarkably free from the propensity to swell in water, and so would be extremely useful for subaqueous piles, besides being most suitable for beams and uprights in domestic architecture. — *London Correspondence Manchester Courier.*

Paraffine Floors. — M. Burd of Lyons has stopped absolutely the sweeping of floors of hospital wards. He has the floors covered with a coat of a solution of paraffine in petroleum, which makes them impermeable to anything, and gives them a brown tint. A single application lasts two years. Thus prepared the floors stand very well wiping every day with a damp cloth, moistened with some antiseptic solution. The same process can be applied with advantage to barracks, school-rooms and other places. In private dwellings, where the floors are covered with carpets, there should be substituted for the ordinary sweeping the use of mechanical brushes, which, instead of making the dust fly, collect it in special boxes, from which it can be thrown into the fire, the great destroyer and purifier of all germs. This mode of sweeping is especially requisite in the lower stories of houses, since microbean germs are found in greatest number in lower layers of the atmosphere. They are ten times more numerous in the centre of Paris, in the vicinity of the Seine, than on higher ground. In every house, considered separately, the air of the upper stories is incontestably purer and freer from microbes than that of the lower stories. — *Exchange.*

Acoustics of Buildings. — Like the laws of all other sciences those which regulate the transmission of sound are most simple. They depend entirely upon proportion. Given the height of a platform or bench; to this add the height of a person sitting or standing, and one-half the width of the room. These three dimensions — viz, the height of the platform, the height of the speaker, and half the width of the room — being added together should be the height from the floor to the ceiling. The voice of a person speaking from this position will strike the two side walls and the ceiling at the same moment of time. Reverberation is thus reduced to a minimum, and the result of repeated practice shows that this rule is perfectly successful, even to the extent of twice its width in length; in other words, a double square. This simple law has been adopted in many buildings with uniform success. When a room is as high as it is wide the voice has to travel nearly twice the distance to the ceiling than it has to the side walls, and the consequence is that the auditory receive the second word from a speaker in a direct line before the reverberation of the first word has reached it from the ceiling. The Houses of Parliament are a notorious instance of failure. They are little more than 40 feet in width and as much in height. Could they be made half as wide again as they now are, and the height remain the same, the acoustic qualities would be perfect. In the case of a law court the continuous rise of the platforms for the counsel somewhat reduce the general height of the room, and, therefore, a little excess upon the above rule may be permitted, but if the width of a court be restricted to 32 feet it is recommended that the height should not exceed 27 feet. — *The Architect and Contract Reporter.*

Peruvian Ruins. — A magnificent work on the curious ruins of Tiahuanaco on the high plateau of Peru has been published by Wiscott at Breslau. It is by Stübel, who with Reiss published the great work on the necropolis of Ancon, assisted by the antiquarian Uhle. It is a huge folio in two parts, the first containing maps, colored prints, and forty-two photographic plates, the second the greater part of the text. Like former investigators, Herr Stübel thinks that a race of high civilization undertook to erect a religious edifice on these high arid plains, but were forced to stop before the buildings were finished. The eminence at Ak-Kapana was a natural one, not an artificial mound. Stones weighing 100 and 150 tons were brought from great distances across several inlets of Lake Titicaca. The remains are absolutely unique and are megalithic, like Stonehenge in England, but represent a higher form in which true architecture must be admitted. Stübel believes that the carved doorways and columns show that the style of architecture was developed in a wooded region and abruptly transferred to stone on the plateau where no trees are to be had. The great question whence the people with a style of wooden architecture came, is considered at length, and the opinion is expressed that they were the Aymaras, elder brothers of the Quechuas or Peruvians proper, of whom the Incas were the rulers. They are the true aboriginal holders of the Titicaca basin, and they may have come from wooded lands to the south. The Quechuas overcame the Aymaras before the Spaniards arrived, and it is supposed that Ak-Kapana then became deserted, the building or buildings being still incomplete. The finds at this early religious centre include a drinking-glass of pottery shaped like an hourg-lass, found on Titicaca Island; two or three statues in stone, and columnar shafts rudely shaped like the human figure. Some attempt is made to explain the symbols carved on the famous doorway, made of a single block of stone, and the dressed stones scattered over a wide district are used to reconstruct in imagination the unfinished temple. — *N. Y. Times.*

The Elgin Marbles, — Every year or so it is rumored in Athens that we are going to send these stolen treasures back. England is the only nation in the world which has ever been known to surrender valuable territory unthreatened and simply on sentimental grounds. If England gave up the Ionian Islands, they argue, worth several millions sterling, why should they not give back the marbles, which, if put up to auction in lots, would hardly fetch a million. Captain Trant, writing in 1830, said that it was reported that the King of Bavaria, who was a great Philhellene, had expressed his intention of making his Glyptothek at Munich disgorge the Æginetan marbles, and restoring them to Greece. He rightly thought it problematical, and they are, of course, still at Munich. Oddly enough, the people who abuse us most for having robbed the Parthenon are not the Greeks, but the French, who have done more of that kind of thing than any nation since the Romans. This occurred to Chateaubriand (who confessed to a certain amount of mild spoliation himself), and he attempted to contrast our thefts with those of his compatriots; his first distinction that they did not pull down to take away is plausible, but will not bear examination, as the bare places they left behind them in Italy were quite as great eyesores, and the precious prey did not stand in so great need of protection; his second distinction, that in their case the glory of France required it, smells too much of vanity for us to have anything to do with it. The question of the restoration of the Elgin marbles is one of artistic expediency. Few Englishmen would maintain that we had a moral right to keep them longer than is necessary in the interests of art. The first question to be decided is whether they are more useful to the world in London or in Athens. If it be in doubt, the original ownership of Athens should shift the balance of proving the superior advantages of London on to us; if it be admitted that Athens is the more suitable place for them, the question resolves itself into selecting the right moment for their restoration. This will obviously be when they will be in no danger from either a foreign enemy or a revolutionary mob. I am inclined to answer the first question in favor of Athens. To the second I should reply that as long as Deleyannism exists the marbles must stay in the British Museum, which means that, before they go, the criminal statistics must show a very marked improvement, and the drachma must get to within ten per cent of its nominal value. — *"Greece under King George," by Bickford Smith.*

Deflection of the Roof of the Town-hall at Lewes, Eng. — There is some apprehension in Lewes about the stability of the new municipal buildings. The town councillors do not appear to be more confident than other people that an accident may not arise. At the meeting on Wednesday several questions were asked on the subject. In reply it was admitted that there was a weakness in the building and the walls had bulged out, but rumor had exaggerated the mischief. The roof of the assembly-room is also supposed to be unsafe, and the commitee, in order to create some confidence in the minds of the inhabitants, called in Mr. John Johnson, architect, of London. In his report, dated August 29, Mr. Johnson says that his opinion, based upon upwards of thirty years' experience and the erection of several roofs of similar span is, that the deflection existing is due to the weight of the tiling (about three times that of slating) and the fixing of struts not executed as described on the drawings, thus exerting a strain upon the principals which reacts upon the walls. On stretching a line from end to end on the west side he found that the sill of the central gable window is 2 3-8 inches beyond the sills of the two end ones. Externally this is very obvious, but internally nothing is visible excepting very slight cracks in the plastering of cove, etc., proving that most of the deflection took place when the walls were green, before the plastering was executed and that very little movement has since been visible. Mr. Johnson considers no danger exists, especially as it must be borne in mind it is next to impossible to execute a collar-braced roof of great span perfectly rigid, owing to the elasticity and shrinkage of timbers of large scantlings. In this case the Corn Exchange buttresses up one side, consequently the strains and movements are thrown to a great extent on one side only. The timber is of good quality and he cannot complain of the workmanship as the joints are fairly fit, considering the extraordinary season of hot weather. To relieve the load on the gables the architect proposes support which Mr. Johnson thinks is judicious, and he suggests, to strengthen the joints, that six-by-one-half-inch steel plates be bolted on each principal at the junction with tie-beam. On these comparatively small matters being carried out, Mr. Johnson believes that neither heavy falls of snow nor severe gales will have the least detrimental effect upon the structure. — *The Architect.*

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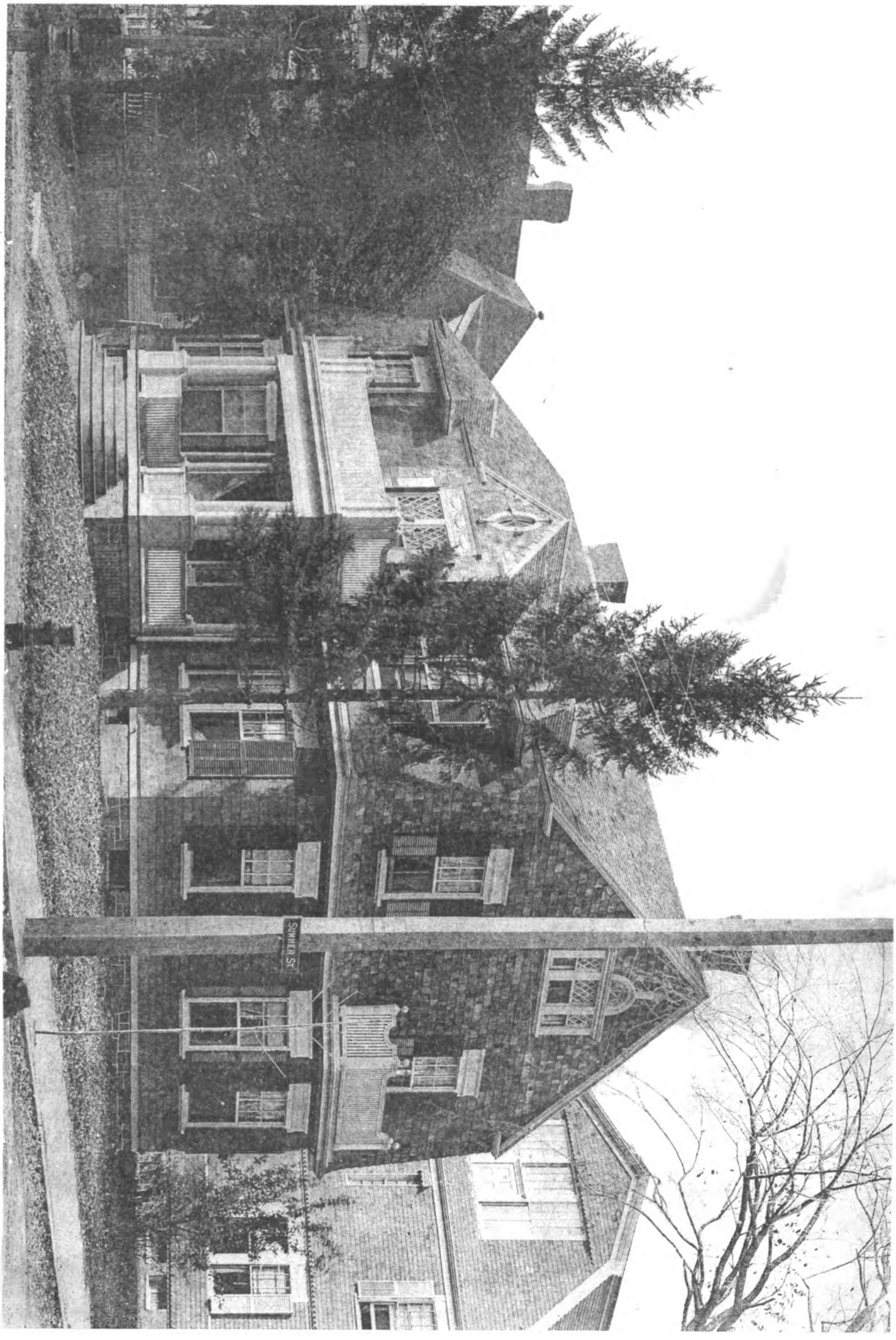

COTTAGE OF CHARLES M. HEMENWAY, ESQ., SOMERVILLE, MASS.

SAMUEL D. KELLEY, Architect.

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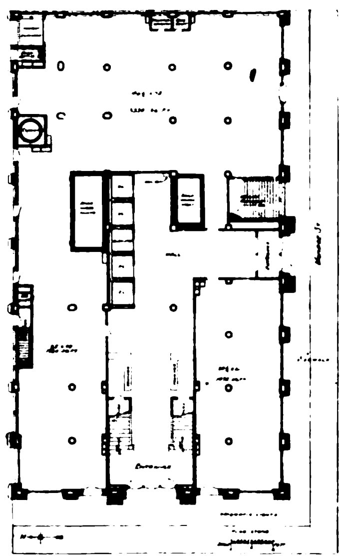

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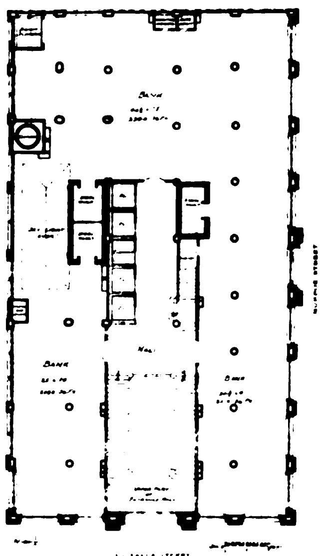

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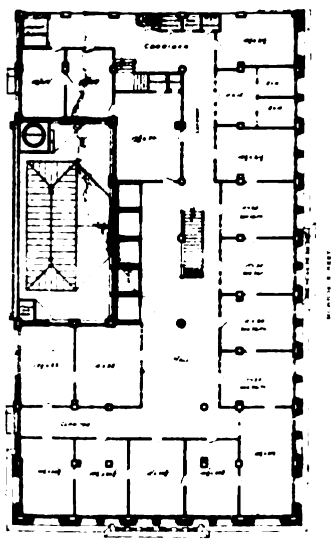

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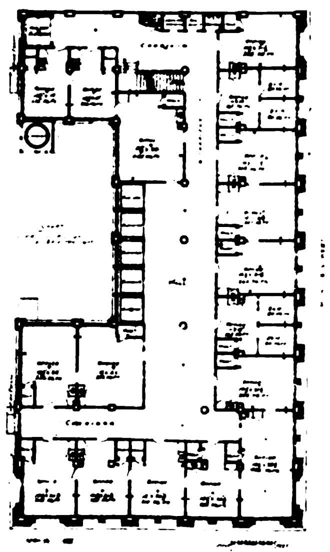
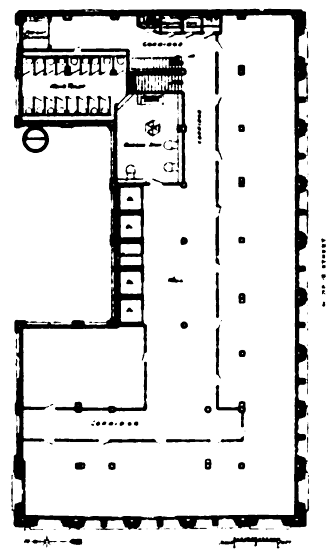


FOURTH FLOOR AND TYPICAL PLAN



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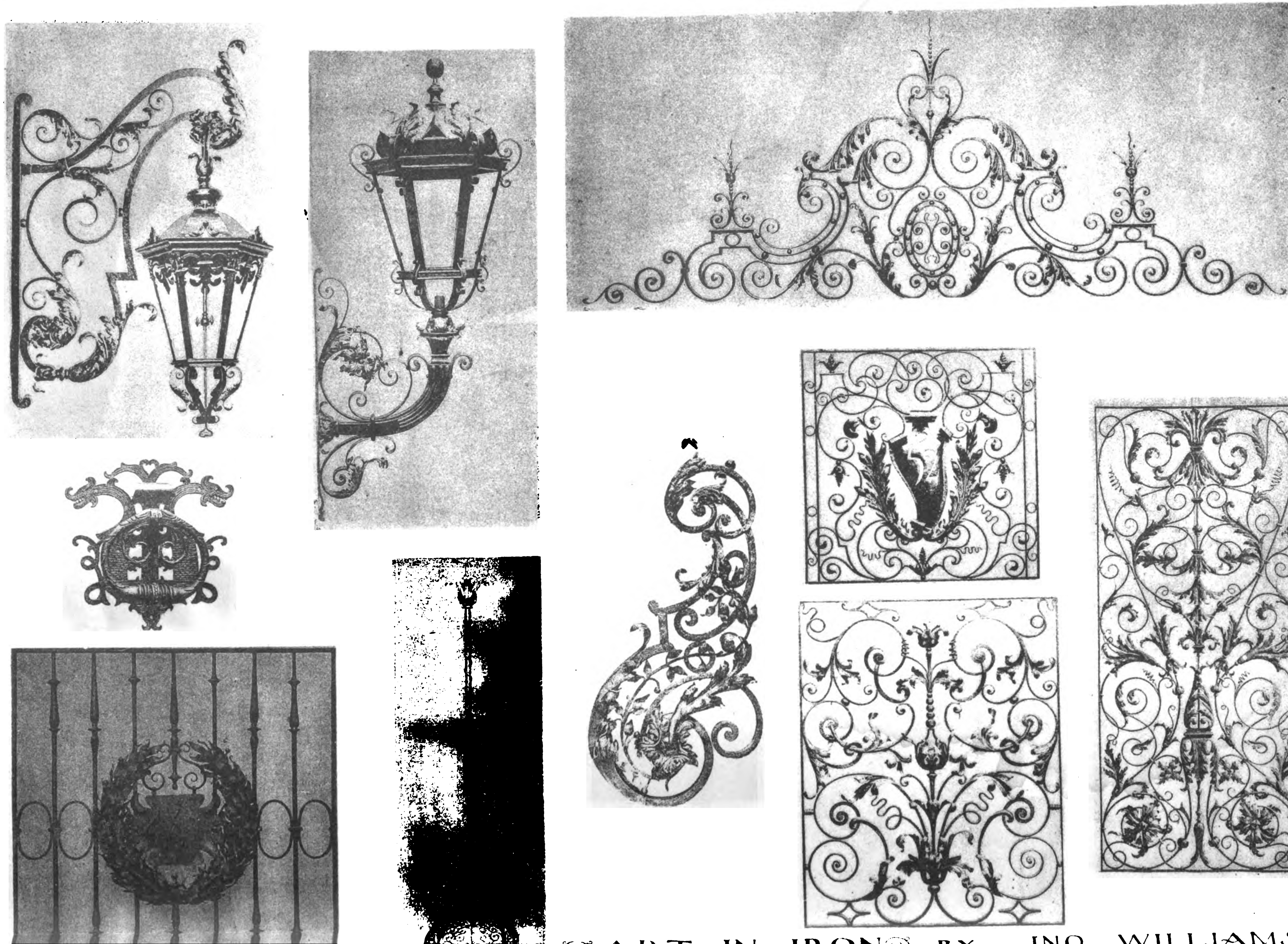

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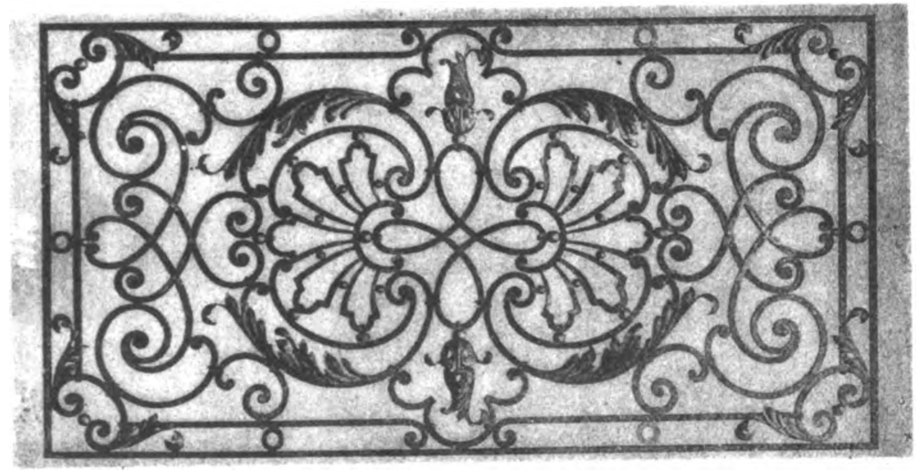
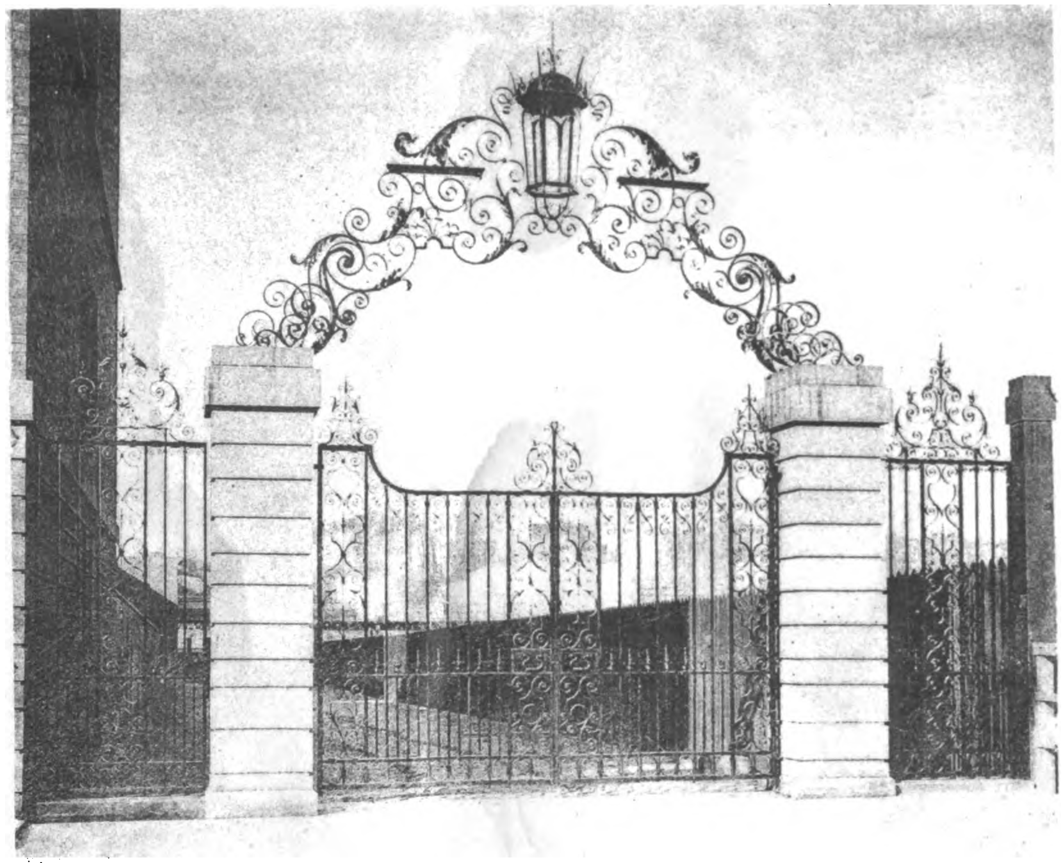
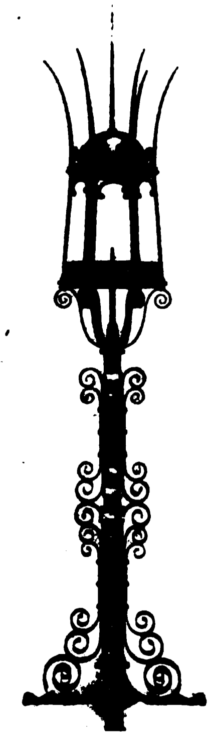
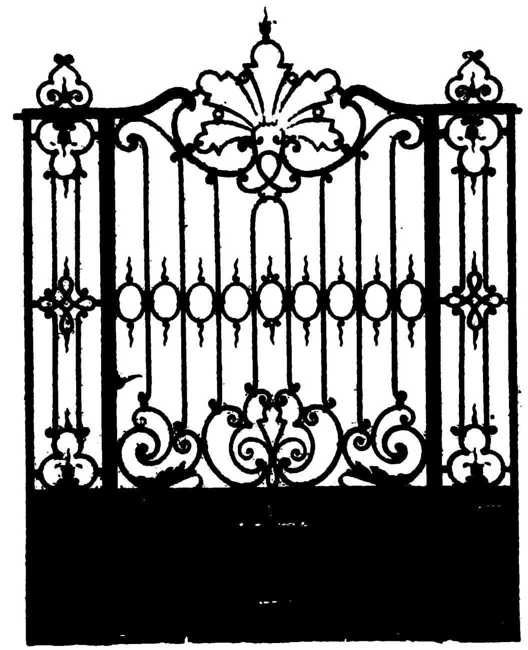

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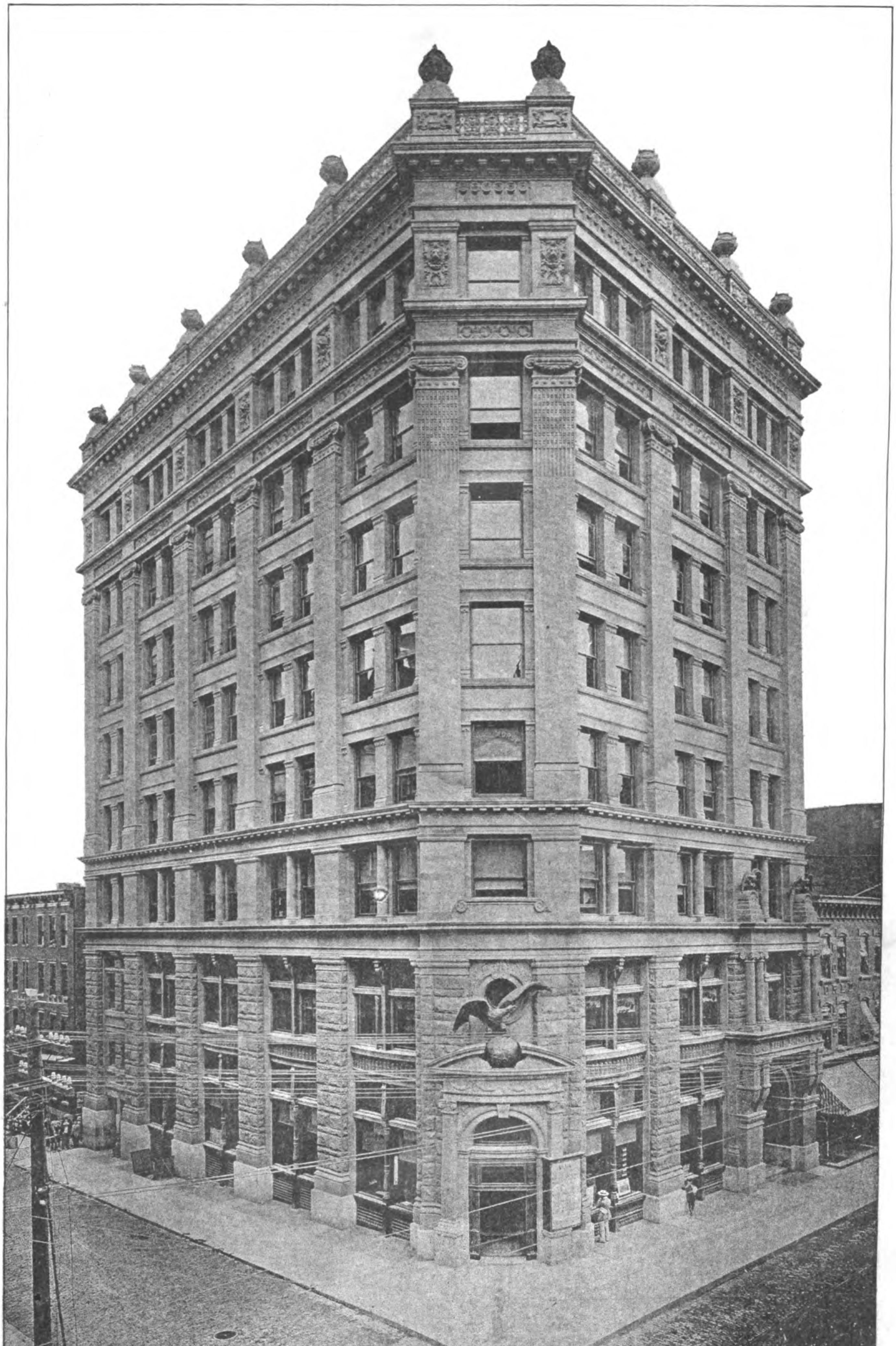


THE "EAGLE" BUILDING, BROOKLYN, N.Y.

GEORGE L. MORSE, Architect.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XLII | No. 934.

Entered at the Post-Office at Boston as second-class matter.

NOVEMBER 18, 1893.

CONTENTS

THE law authorizing the Secretary of the Treasury to employ professional architects to design and superintend Government buildings has not yet been put into practical operation. It is well known that the present Secretary of the Treasury, like many people brought up north as well as south of Mason and Dixon's line, has rather a dim idea of what architects are good for, and, in the present condition of the Treasury, probably feels safer in leaving the designing of his buildings to the Government plan-factory, whose operations he can, at least, count upon with certainty, than in committing the expenditure of the public money to new men, of whom he has never been in a position to know much. He can, as a prudent man, hardly be blamed for not wishing to undertake now any new ventures, but it will do no harm for those who have the matter at heart to keep the Secretary and the public in mind of the fact that it has been shown by ample statistics that Government building work, under the present system, costs more than similar work done under the care of private architects; and that, even if the cost were the same, the advantage of having Government buildings represent the very best and most artistic designing of a number of the best architects in the country, instead of a few stock patterns, devised by clerks in the Government office, would, in the end, be incalculable.

THE New York *Press* has undertaken this year the periodical description of the houses owned by Trinity Church, calling attention, with more fairness and moderation than has been usual, to the miserable character of some of the tenements, and the high rents extorted from the tenants. It will be remembered that a few years ago, the managers of the church property had a controversy with the Board of Health over an order, passed by the Board, requiring landlords to supply running water on every floor of tenement-houses, and there is a current idea that the church rather neglects the cheap and squalid tenements which occupy much of its land. In point of fact, we imagine that the church corporation is an unusually good and careful landlord. Some years ago, when attention was called in the newspapers to the bad character of the occupants of some of the Trinity houses, the church people immediately turned out the objectionable persons, who were probably sub-tenants, and thus not brought into immediate contact with the landlord. In the same way, the high rents which are mentioned are paid, as the *Press* acknowledges, by sub-tenants, to a principal tenant, who probably pays a low rent. Whether the church ought to feel bound to improve and modernize its property is a difficult question. If its houses were improved, its tenants ought fairly to pay more rent, to meet the interest on the additional investment, and there is something to be said in favor of the idea that a tolerably decent place, where the very poorest people can afford to live, is as suitable a piece of property for a church to hold as a neater and handsomer one, with rents so high that only the better class of persons could pay them; but on the whole, we are inclined to agree with the *Press* in thinking that Trinity Church could advantageously reinforce the spiritual edification which it is so earnest in disseminating by showing itself a little more zealous in its care of those individual members of Christ's church whose physical and moral health it is in a position to promote.

TEN or fifteen years ago, it was the common belief of writers on school hygiene that a school-room should only be lighted from one side. Experiment on themselves had convinced oculists that the most comfortable light for reading or writing was a "unilateral" illumination, coming from the left, and, on their representations, the rule of unilateral lighting was imposed by the school authorities upon the designers of the best schools of the period, who were told that "cross-lights" were at all hazards to be avoided. It seemed to us then that, in applying the experience of a single writer or student to a room full of pupils, the theorists had forgotten that, in a school-room of ordinary width, either the pupils in the portion of the room farthest from the window side would get far too little light for proper or comfortable vision, or those nearest the windows would get too much. Moreover, in summer, currents of air across the room are necessary, to keep the air at an endurable temperature, and the French school designers, recognizing this fact, but not venturing to give up their "unilateral" lighting, met the difficulty by planning windows on one side of their rooms, and, on the other, openings, filled with blind-slats, so that air, but not light, would pass through.

FOR these reasons, we thought then, and said so, that the preponderance of advantages, at least for our climate, lay in "bilateral lighting," by means of windows in opposite sides of the room, and that the "cross-lights" from the two sets of windows, although annoying, were less injurious to the eyes than deficient light, while the advantages presented by this system for the ventilation, or rather, the aëration, of the room were too important not to be taken into consideration. The investigations which had led to the adoption of unilateral lighting were first undertaken in Germany, and the system was not only, at that time, rigidly enforced in new buildings, but thoroughly tested, by comparisons made between the sight of the pupils in them, and those of the pupils in the older school-houses, lighted on what may be called the miscellaneous principle. After a few years of experience, it was shown beyond question that more cases of nearsightedness originated in rooms with unilateral illumination than in rooms of the old sort, with windows on different sides. When this was once established, the Germans, with the anxiety to do the best possible for the good of the children that has always distinguished them in matters of education, changed their rules, and, instead of demanding unilateral lighting, the official instructions on the subject now require that every new school-house shall have its rooms lighted from two sides. The German rules, unless they have been changed recently, prefer that the windows shall be in two adjacent sides, but the objections to this are obvious, the ventilation so obtained being inferior, while, supposing one row of windows to be on the left of the pupils, the others must be either behind them, where they cause an annoying shadow to be projected from the children's heads on their books or papers, or in the wall in front of them, causing a glare in their eyes which is acknowledged by all oculists to be extremely injurious. The Council of Public Hygiene for the Department of the Seine has just adopted a code of rules for school construction, under which, although unilateral lighting is permitted, bilateral lighting is favored, but without specifying whether the windows shall be in adjacent or opposite walls. As school-houses are now planned, with four rooms on each floor, it is certainly cheaper to give

the rooms windows in adjacent sides, but the French code introduces a curious complication into the matter by prescribing that the axis of rooms with bilateral lighting shall run north-north-east and south-south-west, or, at least, shall not vary more than forty degrees from a north and south direction. As, in the usual school-house with four rooms on a floor, the sun would enter each room for at least half the day, whatever the orientation, it is difficult to see why a rule should have been adopted which would be so difficult to comply with on most school-house lots; and, if it was intended to apply to rooms with windows on opposite sides, the orientation is of very doubtful propriety, as a room of this sort, with axis north and south, would have no sun at noon, and full sun only early in the morning and late in the afternoon, when it would strike far into the room, and cause so much annoyance as to require shutting-out by curtains, while an east and west axis would give sunshine all through school-hours, at such an angle that it would not generally be annoying, and need not be shut out by curtains.

THE Marquis Mario Brigaldi, a distinguished designer and decorative painter, died in New York a few days ago, after a long and busy life. He was a native of Milan, where he was born in 1806, but came to this country in 1832, with an artistic reputation already established. After sixteen years' practice in New York, he was summoned to Brazil by the Emperor, Dom Pedro, to design the imperial palace at Rio Janeiro. He met with a distinguished reception in Brazil, and was honored, later, by being chosen godfather to one of the imperial children. On leaving Brazil, he went to Spain, where he built two theatres, one in Madrid and the other in Barcelona, and found his way next to London, where he arranged the Royal Marionette Theatre, and is said to have designed houses for the Duke of Hamilton, and other distinguished persons. Returning to New York, he was for a long time engaged in decorating the Stewart mansion, now the Manhattan Club, on the corner of Fifth Avenue and Thirty-fourth Street.

FIRE AND WATER has observed that the fancy which has seized English ladies for working in wrought-iron is spreading to this country, and that sets of tools, for ladies' use, can already be obtained here, at prices varying from three dollars and a half to six dollars. A small forge is requisite, and with this, and some pieces of iron, added, we may say, to an artistic sense, a quick eye and considerable experience, very pretty little articles can be made by women, which will either serve for the adornment of their own houses, or those of their friends, or can be readily sold. Among these qualifications, we must humbly say, the artistic sense is the most necessary, and the least likely to be found. It takes a bold man to assert that women are not generally gifted by nature with a perfect eye for color, and an instinctive feeling for graceful line and modelling which no instruction can improve, but, in our opinion, it is precisely this conceit which, more than anything else, makes women slow to learn the arts of design, and hinders the development of the public taste by filling our houses with hideous frills and trash executed by women, not after their own imaginings, of which, in their innermost hearts, they feel a well-grounded distrust, but in accordance with what serves women in place of imagination — the directions of some fashion magazine. We suppose that most of our readers have mourned secretly over the prodigalities of misplaced labor which characterized a school of carving once famous among the fairer sex, and, while women well taught can compete with the best male designers in all the decorative arts, as the beautiful work shown annually in New York abundantly proves, no person of either sex can excel in those arts without familiarity with the best that has already been done in them, in addition to the general knowledge of line and composition which comes from the practice of drawing or modelling from nature under good guidance.

SO far as iron-work is concerned, a considerable degree of technical skill in handling hot iron is necessary to success, as the most fertile imagination struggles in vain against a hand which pounds away in scales the metal which it is endeavoring to lead into graceful curves. Moreover, as the iron is comparatively intractable, the forms into which it is wrought must be highly conventionalized, and the idea of such forms must, at first, be obtained from objects already executed. The best modern small objects of the kind are probably made in Munich, where they are manufactured on an extensive scale. The pretty candlesticks and other things brought by tourists from Nuremberg, under the delusion that they were made by the descendants of the blacksmiths who executed the splendid grille-work of the doors and windows in the old houses, are of Munich fabrication, and many specimens of the same sort find their way into our metal-work stores. These are generally good in design, and wrought with great skill, and one or two of them will supply the amateur with examples of nearly all the ornamental devices proper to wrought-iron. Some beautiful modern iron-work is also done in Paris, and the foreign junk-shops and bric-à-brac stores will supply ancient pieces, often of surpassing delicacy, such as escutcheons, keys, locks, hinges and other small articles.

LA SEMAINE DES CONSTRUCTEURS discusses a very important question, in answer to a letter from a correspondent, who is the contractor for the building of a factory. According to the letter, the walls of the factory were up, ready to receive the roof, when a destructive cyclone passed through the town, and struck the building, completely demolishing it, with the scaffolding around it. The contractor says that, to avoid delay, he has cleaned the bricks, and repaired the tools, ready to recommence the work, but he wishes to know whether the loss should fall on him, or on the owner. *La Semaine* replies by giving two views of the subject. According to the first view, which is that of Masselin, Dalloz and Laurent, the loss in such a case falls on the contractor. These authorities base their opinion on Article 1,788 of the Code Civil, which says, "If, in cases where the workman furnishes the material, the thing perishes, in any manner whatever, before being delivered, the loss of it is for the workman, unless it has actually or virtually been accepted by the master"; and on a decision of the Court of Cassation, which says that "if a contractor is charged with constructing an edifice, with his own materials, for the account of a third party, and this edifice perishes before being finished, the loss must be borne by the contractor, and not by the third party."

THESE citations seem sufficiently explicit, but the Jurisprudence Committee of *La Semaine* is unable to agree with the other commentators as to the real state of the law. Dalloz, in his remarks on the subject, rather goes out of his way to explain that "the workman who furnishes the material remains proprietor of the thing ordered until it is finished, and delivered to the person to whom he has agreed to deliver it"; and farther on, "The loss of the thing falls on the workman, because, until its delivery, it is to him that the thing belongs; it is, therefore, not necessary to inquire whether there has or has not been fault on his part." It seems to us that this is opening up quite another question, and that it would be much more sensible to say that the loss falls on the contractor because he has agreed to deliver a certain thing, and cannot do so, if it blows down while in process of construction, without rebuilding it, than to rest the matter on the very uncertain ground of the technical proprietorship of the building; and the Jurisprudence Committee see this at once. Accepting, with M. Dalloz, the view that it is the technical proprietor of the building who must bear the loss, under the general legal principle of *res perit domino*, they claim that the owner, not the contractor, is the proprietor, even of an unfinished building, for the reason that the owner of the soil always becomes the owner of everything attached to the soil, whether consisting of a complete structure, or of unfinished walls. There is no doubt that if a contractor builds a wall on another man's land, the wall becomes annexed to the real-estate, so that the contractor cannot pull the wall down, and carry off the materials, even though he may not have been paid for them; and this fact seems to the Jurisprudence Committee sufficient to fix the owner of the land as the proprietor, or *dominus*, of even the unfinished building, within the meaning of the Latin maxim. As a mere piece of reasoning, the argument of the Jurisprudence Committee seems to have an advantage over that of M. Dalloz, but, as we suggested above, we doubt very much whether a court would forsake, in its consideration of such a case, the firm ground of the interpretation of the contract, to wander among the bogs and quicksands of the technical proprietorship of real-estate, and, certainly, no decision showing any such tendency has yet come to our notice.

TOWN-HALLS.[1] — III.

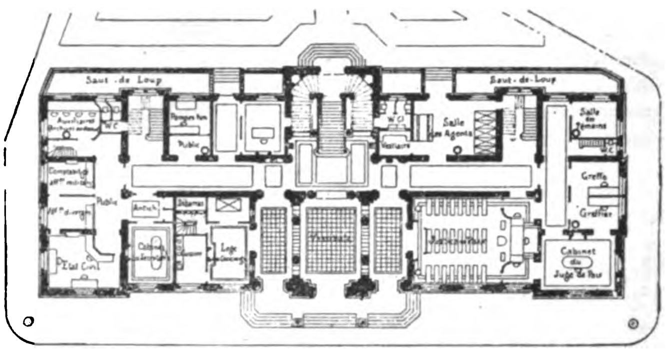


Fig. 20. Mairie at Valence, France.

OF large *mairies*, or moderate sized town-halls, those of Valence and Suresnes may be cited. As the programme of such constructions is nearly always the same, we will take the town-hall of Valence (Figs. 20, 21) as a type and give somewhat in detail the conditions imposed upon the competitors for furnishing the plans.

The building was to be erected within the limits of a rectangle having a maximum area of 846 square metres, 45 square decimetres. The sum of 400,000 francs, fixed upon for the outlay, was to cover all expenditures on the foundations and superstructure, exclusive of all movables. This sum must likewise include the cost of the ordinary interior decorations and

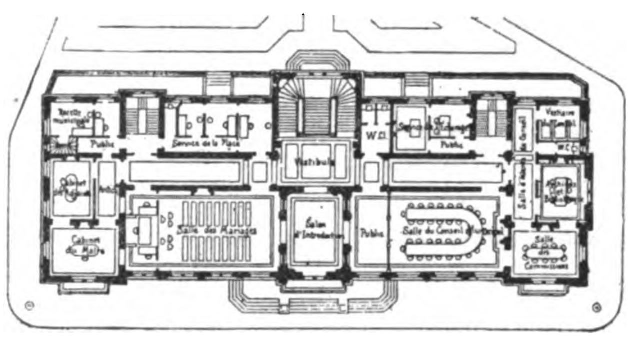


Fig. 21. Mairie at Valence, France.

the permanent work required for putting-in one or several furnaces at a later date.

The introduction of gas and water had also to be provided for in the plans, the expense of which was to be included in the 400,000 francs mentioned above, excepting, however, that of the lighting apparatus properly so-called. The basements of the building were to be in hard limestone from the quarries of Chomérac or Ruoms (Ardèche); the steps of the stairways in stone from Sauzet or Montceau (Drôme). The façades, angles and cornices were to be of white freestone from the

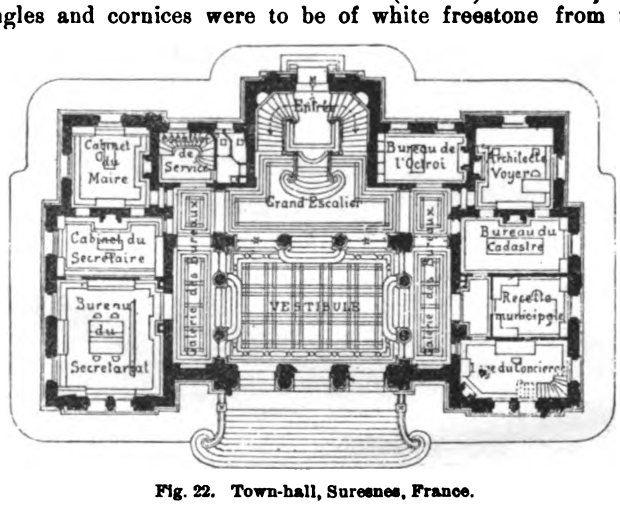


Fig. 22. Town-hall, Suresnes, France.

quarries of Saint-Restitut and Saint-Paul-Trois-Châteaux (Drôme).

The town-hall, planned to accommodate a city of 50,000 inhabitants, must comprise all the municipal services and be disposed as follows:

[1] From the French of E. Rümler, in Planat's ***Encyclopédie de l'Architecture et de la Construction.*** Continued from No. 933, page 68.

UNDERGROUND FLOOR.

Cellars: storage-space for wood and coal; store-rooms for tools and instruments; hall for the old archives and place for one or several furnaces.

IN THE DIFFERENT STORIES.

Apartment for the concierge; constructional department, street and water service; public-lighting service; police;

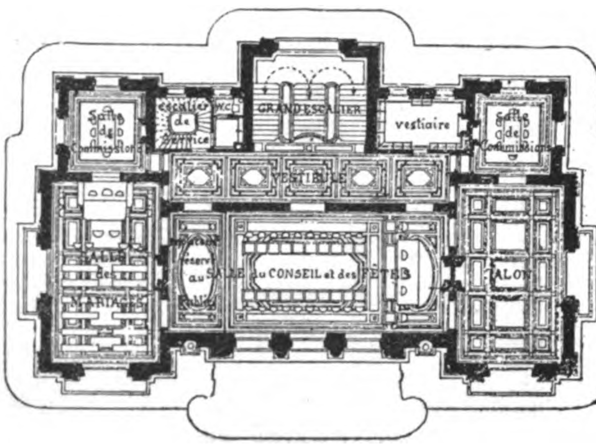


Fig. 23. Town-hall, Suresnes, France.

exchange offices; *mairie;* justice of the peace; town collector's office; store-rooms for small materials used at public fêtes, such as flags, escutcheons, etc. These might also be placed in the attic.

Each of the municipal apartments was to be made up as follows and include the various rooms hereafter designated:

1. *Apartment of the concierge:* Kitchen, store-room, two other rooms.

2. *Constructional department, street and water service:* Office of the street-surveyor; office of the employés; public waiting-

Fig. 24. Suresnes.

room; store-room for instruments, samples, etc. (in the underground story if necessary).

3. *Public-lighting:* Office of the director; employés' office; store-room for small articles (in the underground story, if necessary).

4. *Police:* Office of the central commissary; public waiting-room; hall for policemen; cloak-room for policemen; two strong-rooms (in the underground story, if necessary).
5. *Exchange:* Three rooms.

ancient and modern; public waiting-room adjoining the offices and separated from them by gratings.
7. *Collector's office:* Counting-room with public waiting-room; collector's apartments, connecting with the office and

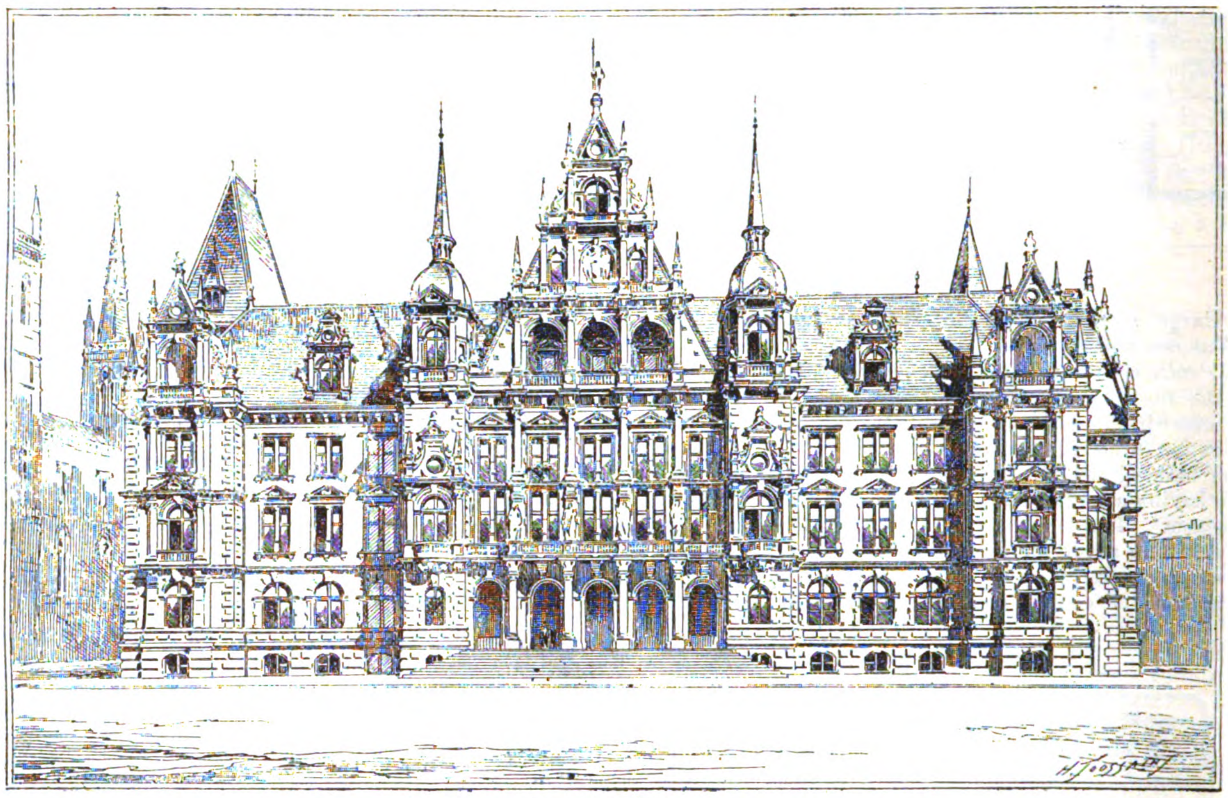


Fig. 25. Wiesbaden.

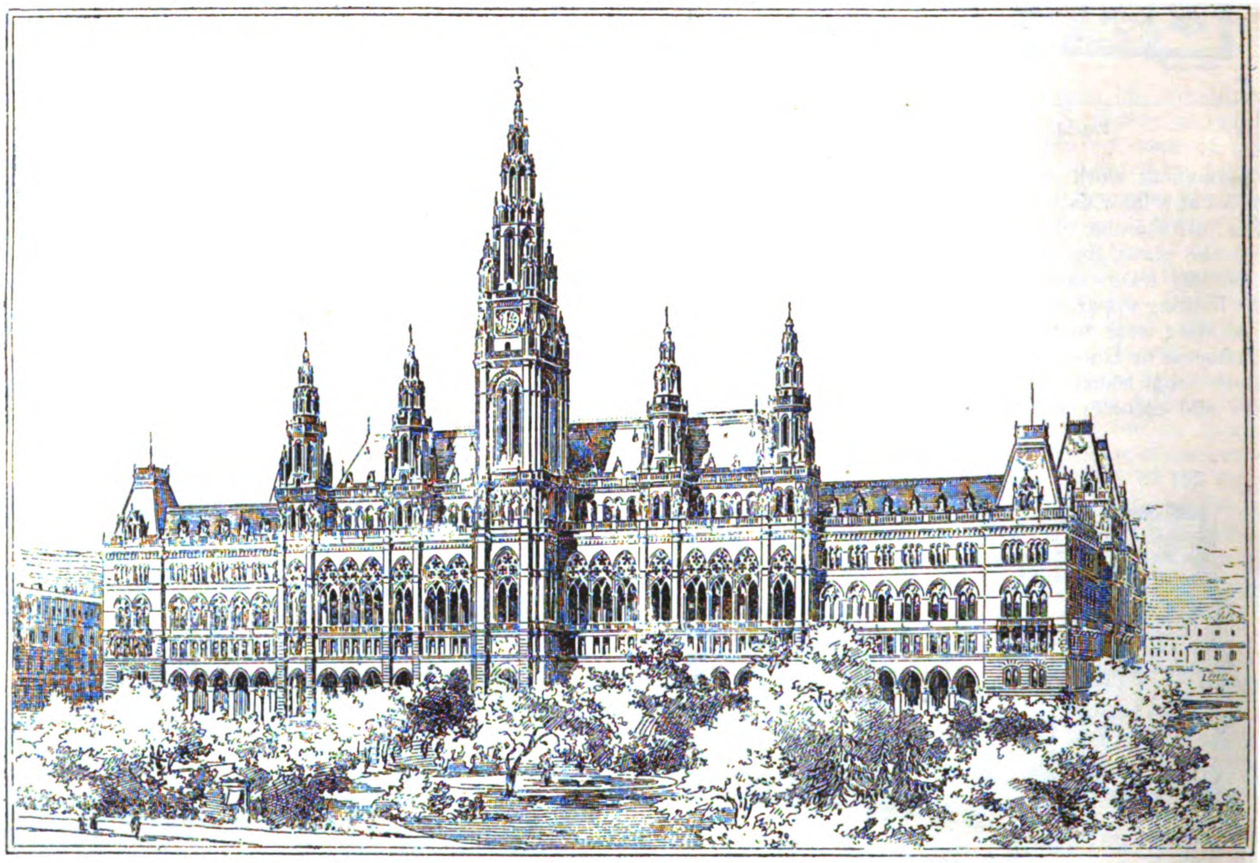


Fig. 27. Vienna.

6. *Mairie:* Mayor's office and deputies' office, with ante-chamber; council-chamber, with a section reserved for the public; hall for committee-meetings; hall for marriages and receptions; office of the general secretary; five offices: *civil state, miscellaneous business, accounts and military affairs, funeral ceremonies, auxiliary employés;* hall for the archives, consisting of kitchen, store-room, dining-room, parlor and three other rooms.
8. *Justice of the Peace:* Audience-hall; clerk; justice's office, with public waiting-room; room for the witnesses; storage of archives, etc.
9. Necessary cloak-rooms and water-closets.

The important divisions of the city service and the municipal apartments of honor were to be, so far as possible, on the principal façades; the offices were, moreover, to be so disposed as to receive as much light as possible. Architects were obliged to bind themselves to place the offices of the same division in proximity to the chief's office and in easy communication with it; the offices of the heads of the various boards must also be very easily accessible to the public.

Although the city proposed in the end to put in one or several furnaces, the plan had, nevertheless, to provide, as to

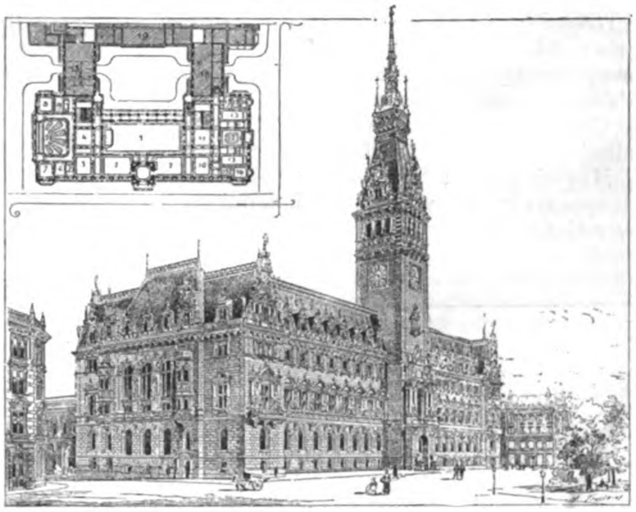


Fig. 26. Hamburg.

disposition and expense, for the introduction of the ordinary and decorated fireplaces wherever it should be deemed expedient in order to assure the heating of the apartments by the usual means.

The town-hall of Suresnes (Figs. 22, 23, 24) is also considered a good example, both as to the plan and also from an

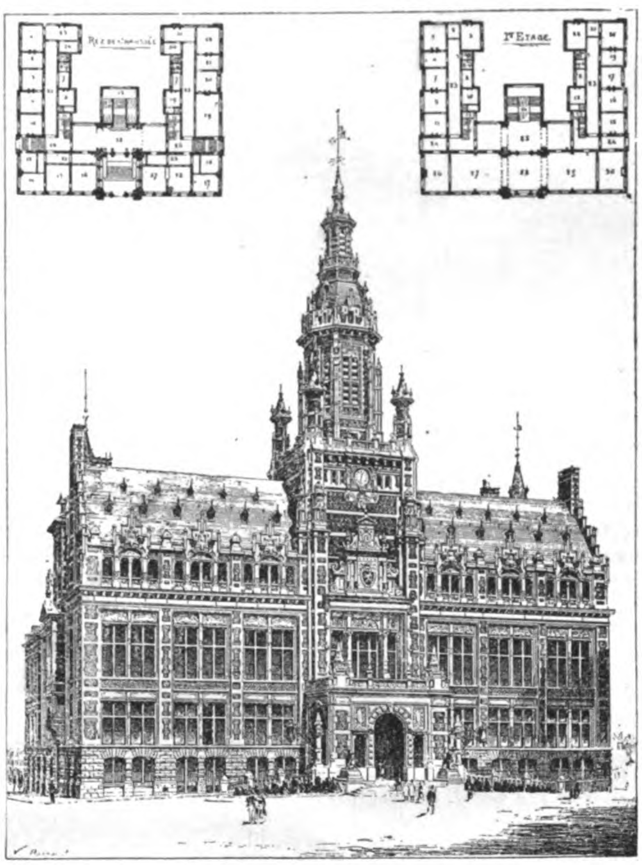


Fig. 28. Schaerbeck (Belgium).

architectural standpoint. It occupies an area of 460 square metres and comprises an underground story, a ground-floor, a first story and a second story in a part of the building.

The underground story is occupied by the offices of the charitable board, a fire-engine room, a room for the storage of fête materials, two apartments for the use of the *concierge* and the cellars necessary for the furnace.

On the ground-floor in the axis of the principal façade, and below the level of the offices, is a vestibule surrounded on three sides by galleries on which open directly: on the left, the offices connected with the secretary's department; on the right, the office of the *octroi*, the city surveyor's office, the hall of records, the town collector's office and the *concierge's* apartment, which communicates by a special small stairway with the two rooms reserved for him on the floor below.

In the axis of this vestibule is the principal stairway leading to the first story, and admitting of a secondary entrance in the rear façade. The first story is occupied by the council-chamber, the hall for marriages, a parlor, two committee-rooms

Fig. 29. Birmingham.

and a cloak-room. A service stairway, starting from the ground-floor, gives access to the second story (secretary's apartments), as well as to the roof and the bell-tower.

The Germans and Austrians show a fondness in their municipal edifices for mediæval and Renaissance styles. The town-hall of Wiesbaden, one of the most recently constructed, possesses all the characteristics of the German Renaissance; especially noticeable is the gable in different stories (Fig. 25). The plan, although rectangular, is very symmetrical and the services are conveniently disposed. At Hamburg, the inevitable belfry reappears, crowning a vast edifice, with simple lines, and on a rectangular and well-arranged plan. The following legend indicates the interior distribution (Fig. 26).

1. Council-chamber; 2. Waiting-room; 3. Lecture-room; 4. Foyer; 5. Room for meetings; 6. Cloak-room; 7, 8. Lecture-rooms; 9. Working-office; 10. Lecture-room; 11. Vestibule; 12. Senate; 13. Committee-room; 14. Cloak-rooms; 15. Parlor; 16, 27. Working-offices; 18. Offices and working-rooms; 19. Stock-exchange.

It was from the Gothic style that the architect of the new town-hall of Vienna (Fig. 27) drew his inspiration. We find

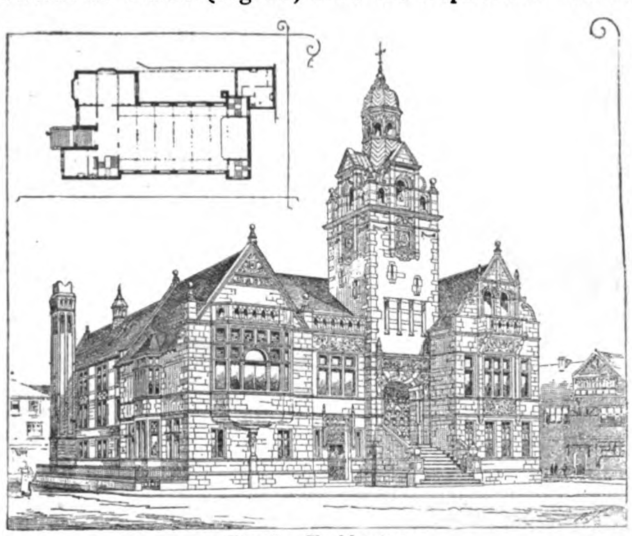


Fig. 30. Cleckheaton.

here, it is true, a rather complicated mixture of German, Italian and French Gothic forms, and even certain Renaissance motives. The plan is square and quite geometrical in distribution: it has been given in the *American Architect* for January 31, 1891.

Like Germany, Belgium and the Flemish countries have remained faithful to the traditions of their noble architectural period. Here the Renaissance still furnishes the type for municipal buildings. In justice to the architects of the present day, it must be said that they handle these skilfully and know just how to modernize them. A good example is the town-hall of Schaerbeck, a view and plans of which are given in Figure 28; the distribution is indicated by the following legend:

Ground plan: 1. Educational collections; 2. Clerk of instruction; 3. Director of instruction; 4. Deputy of instruction; 5. Stairway; 6. Water-closet; 7. Public; 8. Waiting-room; 9. Lift; 10. Deputy of finance; 11. Stairway; 12. Controller; 13. Stairway of honor; 14. Treasurer; 15. Collector; 16. Accounts; 17. Head-clerk; 18. Marriages; 19. Burials; 20. Engineer; 21. Deputy head-clerk; 22. Clerk of the Street Board.

First-floor plan: 1. Army affairs; 2, Public; 3. Charity; 4. Enquiry-office; 5. Service stairway; 6. Water-closet; 7. Head-clerk; 8. Public waiting-room; 9. Secretary; 19. Deputy; 11. Burgomaster; 12. Lift; 13. Stairway; 14. Stairway of honor; 15. Deputy, civil state; 16. Deputy, public works; 17. Architect; 18. Overseer; 19. Clerk; 20. Draughtsman; 21. Various plans; 22. Health board.

In England, all the different styles are adopted; nevertheless, the English Renaissance is more in favor than other types; and the belfry is, of course, found on all town-halls; this is true even of that at Birmingham, which is in the Classic style (Fig. 29).

The plans, as well as the architecture, vary infinitely in this country. No principle is followed. The lack of symmetry, so dear to an Englishman, prevails in the municipal building as in the cottage; but here it shocks our notions of logical disposition and regularity of plan.

However, in small places, town-halls of moderate size sometimes present a simple and convenient distribution, as at Cleckheaton (Fig. 30). But this is not always true of the large cities; it requires but a glance at the plans of the municipal buildings of Sheffield (Fig. 31) to convince one of this fact. The legend given below explains the distribution of the various services.

Ground plan: 1. Building inspectors; 2. District surveyors; 3. Borough Surveyor; 4. Sample-room; 5. Lavatory; 6. Borough-surveyor's clerks; 7. Borough-surveyor's drawing-office; 8, 9, 10. Plan-rooms; 11. Enquiry-office; 12, 13. Mortgages; 14, 15. Accountants; 16. Strong-room; 17. Courts; 18, 19, 20. Water-inspection service; 21. Superintendent; 22. Show-room; 23, 24. Collector's office; 25. Office; 26. Porter; 27. Strong-room; 28, 29, 30. General and assistant managers; 31. Accountant; 32. Telephone; 33. Chief clerk; 34. Auditor; 35. Water-works, public office; 36. Vestibule; 37. Borough-accountants, Public office; 38. Book-keeper; 39. Auditors.

First-floor plan: 1. Sub-committee; 2. Strong-room; 3 Lavatory; 4. Town-clerk's general office; 5. Waiting-room; 6, 7. Town-clerk; 8. Mayor's business-room; 9. Committee-rooms; 10. Serving-rooms; 11. Balcony; 12, 13. Conveyancies, deputy town-clerk; 14. Strong-room; 15, 16. Engineer's drawing-office, plan-room; 17, 18, 19. Council-chamber; 20. Cloak-room; 21. Ante-room; 22. Principal stairs; 23. Ladies' cloak-room; 24. Dining-room; 25. Reception-room; 26. Mayor's parlor; 27. Court.

It appears from this brief sketch and from the accompanying illustrations, that great diversity necessarily exists in the plans of municipal buildings, which must be constructed according to the services to be accommodated. No principle can, therefore, be laid down; but the examples which we have given may guide architects in many cases. E. RUMLER.

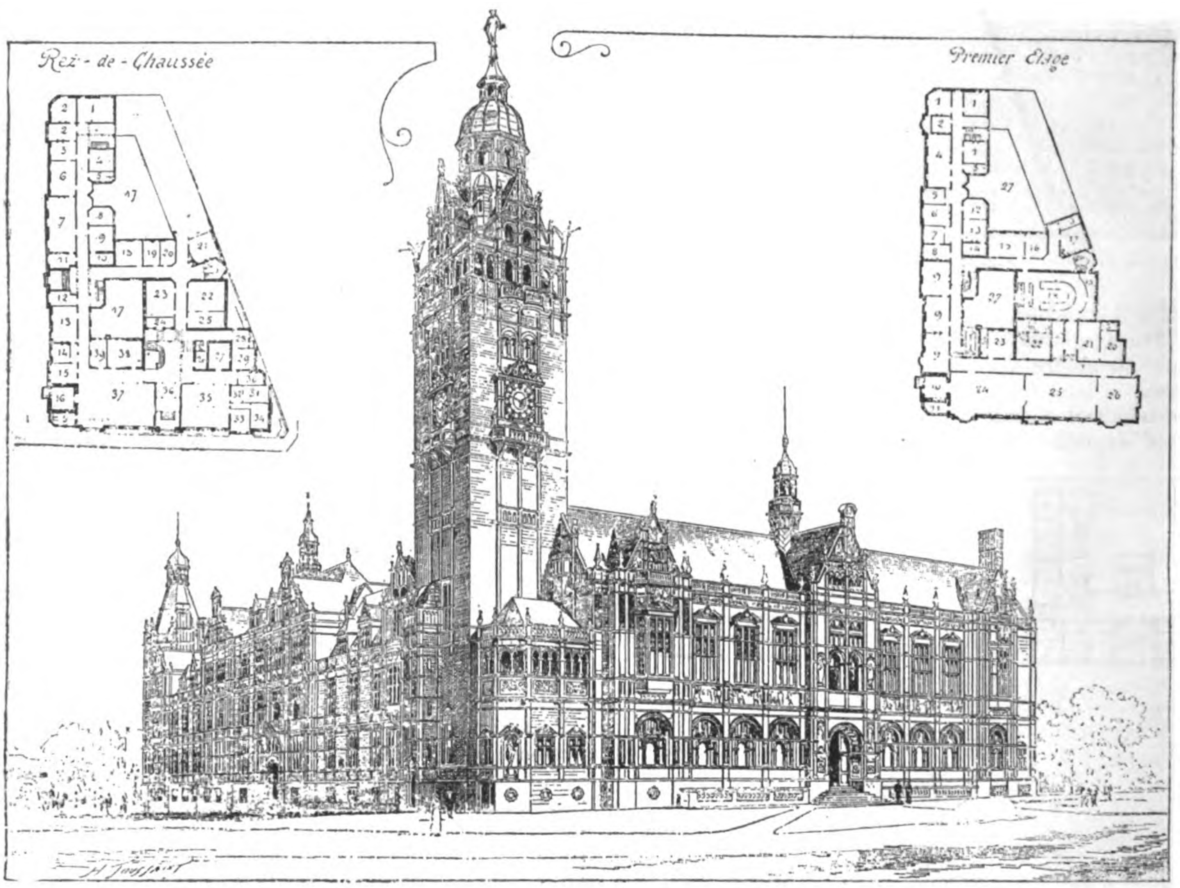


Fig. 31. Sheffield.

THE GREAT EXHIBITION REVIEWED.[1]—VI.

THE ARTS AND ART MANUFACTURES OF JAPAN AT THE GREAT EXHIBITION.

It is certain that no contributing nation has made a greater effort than Japan to display, in expected competition with the other countries of the world, its progress in all arts, sciences, manufactures, agriculture, horticulture, mining and other industries. This is evident in every place where such effort was possible. Standing alone in her production of works of Fine Art, and not even approached in this respect by neighboring countries; being the only country on earth having consecutive art traditions which have marked a consecutive development for two thousand years; and preserving and practising up to those traditions, almost intact, down to the present time, uninfluenced by surroundings and modern innovations, it was expected that she would make an exhibit most unique in its character and

[1] Continued from No. 932, page 59.

varied in its extent. In this she has not disappointed us except in a few particulars. The works of her individual artists are above criticism. There is no one with the technical knowledge requisite to criticise them. It is only when they step out of their proper sphere that we can do so; and we must look for illustrations, if we would, among things for which we have a profound admiration.

Since the three great vases of Shippo ware, exhibited by Shirozayemon Suzuki, of Yokohama, have been moved from the Manufactures Building to the most prominent place in the Fine Arts Palace, they may be a proper text for some reflections upon the present condition of the Fine Arts of Japan and the proper relation of art to art manufactures in that country. Time was — and not many years ago — when such relation was unknown; for, twenty years ago there were no manufactures, properly speaking, in existence there.

Every man who made anything was his own designer and his own artisan. His work was generally done at his home, and whatever assistance he received was from members of his own family or his apprentices, who worked, not so much for wages, but with the hope that they might become his successors. He was doing the work that he learned from his father or one to whom he had been apprenticed. Possessed of all the traditions that his father or teacher had inherited from a line of ancestors doing similar work, his great ambition was to add his experience to that of his predecessors, and his art to their art, so that in his hands ti would be of greater beauty and bring greater renown. After the revolution that deposed the Tokugawa Shoguns, who for nearly three hundred years, while they may have been great tyrants, had been the greatest conservators of art that Japan had ever known, the study of everything foreign became a fad. And while the introduction and development of all the scientific and mechanical appliances that other nations possessed has been the greatest blessing that this country has ever received; the attempt to import foreign art, however good, and to imitate it, was a most laughable failure. It was ridiculed by foreign critics and soon came to an end.

The highest expression of artistic feeling in Japan was always, up to that time, given to objects of common use and for domestic adornment. A picture or statue was rated no higher as such than a vase or plaque. In fact, the latter were generally carried to higher degrees of artistic excellence, and embroidery was a medium of artistic expression of more importance than painting on silk or paper. Japan was probably the only country on the face of the earth during its long period of isolation wherein art was indigenous and universal.

As a consequence it possessed all the *material* for artistic development in any direction in which it chose to be led. If its art is to become only a manufacture there are plenty of employés to be had who have the preliminary education for the work to be done under patronage and direction, however bad the latter may be. The resulting pieces will have enough of the old Japanese spirit in them to, at first, mislead all but those who make the crucial test. The combination of labor on a single piece will enable manufacturers to turn out large things in a short time, and get quick returns on an investment of capital, which is a necessary concomitant of this kind of business. In this is the dangerous tendency of modern Japanese art that may lead to its degradation, and extinguish the individual artist with all his inherited traditions forever. Having escaped from the Scylla of imported art he is in equal danger from the Charybdis of the art manufacturer. The latter has already been established, as these exhibits testify. But he is still a rarity and if the individual artists hold aloof from him their art may still be saved. In looking at these vases, so pretentious and dazzling, we have wondered what Tsunikichi, the inventor of Shippo (cloissonné) ware, who died in 1883, honored by his appreciative sovereign, would have thought of them.

Of all the countries that have exhibited at the Great Exhibition, there is none whose art works are so far above criticism as Japan. The effort put forth by that Government is the most patriotic, the most fraternal and altogether laudable of those made by any foreign country. We are ready to praise almost every art work that they have sent, but we are not willing to put all their art manufactures in the same category. Much praise is due to Mr. Suzuki for the thousand smaller objects that he has sent, the work of individual artists in which each one commenced and finished the same article. But by moving his largest exhibits to the Fine Arts Building he has taken a responsibility which must be shared as well by those who are his superiors as by the authorities of the Fine Arts Department. These articles are set up in the most prominent part of the Exhibition by the highest authority, after having been exhibited where they belonged. It is not only their great size, their pretentions and the value put upon them, but the official recognition that has put them where they are which is responsible for misleading the host of uneducated people who cluster about them and betray by their expressions of admiration the extent to which they have been misled. If it were not for this they would not be worthy of such extended comment.

These vases are to be classed with works designed to astonish the beholder rather than to have any elevating tendencies. To the Japanese themselves they are denationalizing. The general shapes are contrary to all their traditions. The two outside ones are decidedly the best, being circular in plan, while the central one is oval, a form never before used in Japan. It is short and fat, the deficiency in its height being made up by putting on it a dome-shaped cover surmounted with an eagle.

They were made especially for the Exhibition in the factory of Mr. S. Suzuki at Yokohama, with the coöperation of Mr. S. Tsunekawa of Nagoya, and credit for the design and execution is given as follows: The general design by S. Shiwoda, the painted design by K. Araki of Tokyo and the drawing in ink on copper by K. Oda of Nagoya. The men who executed the mechanical and artistic work are G. Tsukamoto and K. Y. Hayashi of Toshima. The design for the wood-carving on the bases was by S. Nishiyama of Nagoya and the execution by K. Yeguchi of Nagoya. The bronze eagle on top of the central vase was made by Y. Sugiura of Tokyo. The greatest height of the vases with their wooden pedestals is eight feet eight inches, and they are undoubtedly the largest pieces of cloissonné in existence. It is this size alone that gives them importance, and it only shows that a mechanical feat has been accomplished.

The octagonal bases of Keyaki wood are decidedly European in design and finished black, but the deeply-cut panels carved from the same wood, with polished brass backgrounds show the natural buff color. It is asserted that seventy different kinds of wood are shown on these thirty-two panels. They are certainly magnificent work in the old Japanese manner, not tinctured in the least by outside associations. On these bases rest the vases proper, the framework or base material being copper. The general effect of the outside ones is better than that in the middle but the general outline suggests European rather than Japanese models. Each of them is surmounted by a metal corona of a decidedly Moresco-Gothic design, forming a leaf-work cresting, the separate leaves being inlaid with enamelled panels. Above the corona of the central one rises an enamelled dome forming a censer, surmounted with an American eagle in bronze, of very mechanical workmanship. Each vase has two badly proportioned handles very remotely suggesting the shape of a chrysanthemum blossom and the same is repeated on top of the censer forming a perch for the eagle. The worst attempt at decoration is seen in the draperies that hang from all of these handles, which are stiff and ungraceful, much resembling print-cloths in their decorations of enamel. There is considerable ornamentation in those parts which are not pictorially treated that is foreign to Japan. The ornament around the bottom moulding is common in thirteenth-century decoration and similar to the fleur-de-lis as treated in old French frescoes. The third member of the base being a broad cove, is decorated with buff on a red ground and copied from designs on European fourteenth-century encaustic tiles.

The coved necks are treated with alternate red-and-white stripes intended to suggest the American flag, and each of the stripes is covered with flower-patterns which make them look like pieces of print-goods. The field thus formed is studded with metallic five-pointed stars, each with a flowered enamel panel in the centre. The dome is decorated in the same manner as the necks.

All this is a most unfortunate setting for the really meritorious and unsurpassed enamel paintings on the body of the vases. Of these there are six pictorial subjects. These were suggested by Mr. Shin Shiwoda, councillor for arts to the Japanese Imperial Commission, and have been carried out in the most spirited manner by the artists to whom they were assigned. On the fronts the three seasons, Spring, Summer and Autumn, are typified by a group of two cocks and two hens on the middle one, a mythological dragon sporting in the sea on the left, and an eagle and mate on the right. The backs though not so striking or brilliant in color are still more beautiful. The back of the Spring vase is covered by a magnificent cherry-tree in full blossom. The back of the Summer vase is intended to typify both Summer and Autumn: a flock of gulls is flying over a foaming sea by the light of the moon; and it is the most beautiful of all the pictures. The Autumn vase is, curiously, backed by a Winter scene: a waterfall plunges through a rocky gorge, which is overhung by the branches of a fir-tree covered with clots of snow. In the middle of the gorge is a snow-covered rock, while a large and brilliantly-colored bird is flying downward surrounded by several smaller ones. In this decoration the artists who executed it have stood out supreme and given all the character to the work that it has. The rest, as has been said, is mere manufacture and fully demonstrates the futility of the factory system in executing such things.

There are more excusable evidences of factory-work in the Japanese exhibits of the Art Palace. These may be seen in the embroidery and tapestry work, of which pieces of such magnitude are exhibited that a lifetime would not have sufficed for one person to execute them. Of these are the exhibits of Sozayemon Nishimura, of Kyoto, whose card states that he is appointed Manufacturer in Art Fabrics to the Imperial Household. His exhibits are embroideries of which there are examples, both in Gallery 24 and in the rotunda on the second floor, which in size and beauty have never before been rivalled. Among many are No. 57, the Waterfall at the Source of the Hotygawa; No. 61, a six-panel screen in the gallery; No. 146, a six-panel screen and No. 155, peacocks on a pine-tree in the rotunda. But for artistic and historical value they are surpassed by the tapestries of Jimbei Kawashima, who advertises that he has a main factory at Kyoto and branch establishments. His exhibits in Gallery 24 are Nos. 11 and 68. The former is of great size and contains hundreds of figures, representing a festival in the olden time at the ancient and now unused temple at Nikko, which is regarded by the Japanese as the best of their architectural remains and is now a famous resort for artists and connoisseurs.

There are other evidences that factory-work has invaded the realms of art in a country which once had prospered and nurtured the arts without it. But these will suffice to illustrate our text. The arts of embroidery and tapestry are not yet losers by it, but are on dangerous ground. The individual artist is still everywhere found, and wherever seen in the Exhibition is practically above criticism. His works in the various departments of sculpture, painting, embroidery, bronze, porcelain and pottery only vary in degree of excellence. They are here seen grouped as never before and the memory of them alone will be a blessing to all who have had the privilege to behold them. P. B. Wight.

[To be continued.]

FOUNDATIONS OF HIGH BUILDINGS.[1]

In treating of Foundations before a Congress of Architects, many things must and will be said that are trite and commonplace to numbers of them, and the subject, so interesting in its general aspect, becomes difficult of treatment under such exceptional conditions. It has been thought that the description of a few special cases and the more novel methods in local use would interest many of the members, more especially our visitors from foreign lands.

The high office-buildings of New York are principally on the lower part of the Island, below the City-hall. The surface is from 15 to 35 feet above tide level and the very irregular underlying rock is from 15 to 50 feet below. The soil is yellow sand more or less mixed with clay and containing pockets or beds of quicksand. Many of these buildings rest on piles 25 to 30 feet long, driven to refusal though not always to the rock. Each pile, under the city building-law, may be loaded with twenty tons and advantage is often taken of this permission. Generally the heads of the piles are covered with a bed of concrete upon which the walls and piers are built. Sometimes they are capped with blocks of stone dressed to fair beds that they may bear evenly upon the piles. It is feared that care is not always taken to get the tops of the piles well below permanent water-level; dry seasons and deep drains which may hereafter lower it, must be taken into consideration. In the lower part of New York the permanent water-level is generally not much higher than high tide in the harbor.

The Washington (Field) Building on Battery Place is founded on the rock, except at one point where the bottom of a cleft could not be reached. The gap was spanned by an arch of brick 15 feet in width which carries the walls above it.

The method of founding directly upon the sand is coming more in favor. The Equitable Building and more recently the handsome Union Trust are built directly upon the sand with wide footings, loading the soil to 2 and 2½ tons to the square foot. The *World* and the *Times* buildings have similar foundations.

Many of the older structures, which were often built upon the natural soil a few feet below the surface, have suffered, probably from the lateral flow of quicksand into neighboring excavations. The newer buildings are carried to too great a depth to render such results at all probable.

Under the Mills Building, however, in Broad Street, a test-pit was sunk within sheet-piling. Upon reaching a certain depth, quicksand flowed in so rapidly that fears were entertained for all the buildings near. Fortunately a quantity of concrete was on hand, with which the pit was promptly filled.

The foundations of the Methodist Book Concern were to be carried down to rock, fifteen or twenty feet lower than the foundations of contiguous buildings. To save the expense of underpinning these walls to so great a depth, the new walls were built on piers. Alternate piers were surrounded with sheet-piling, excavated to the rock and filled with solid concrete. When these were completed, the intermediate piers were treated in like manner. Arches were turned from pier to pier and the walls were raised upon them. The adjoining buildings were uninjured. The length of old wall exposed at any one point was too short to cause any dislocation, and the distance between the alternate piers localized the effect of each.

In this connection, some fear was felt lest the unequal shrinkage of the concrete foundation should cause cracks in the walls above. Concrete does shrink, but the experience of the New York Dock Department indicates a shrinkage of not more than of three-eighths an inch to the 100 feet of its long concrete walls.

In the foundation of the new Manhattan Life Insurance Building, is a new application of a method long applied in engineering works. The building itself will exceed in height all commercial buildings up to the present time. The cupola is 353 feet above the street, the foundation on rock 55 feet below, a total from rock to cupola of 408 feet. The great weight of the building compelled that its foundations should be carried to the rock; piles enough to carry it could not have been driven on the site and therefore the system of pneumatic caissons was adopted.

About 4,000 square feet — nearly half the area of site — are occupied by fifteen pneumatic caissons. Eleven of them are rectangular, varying from 1 x 1 feet to 21 x 26 feet and four are circular from 9 to 15 feet in diameter. They are built of steel plates stiffened with large brackets made of steel angles, and the roof is strengthened with I-beams. Area is excavated to 20 feet in depth below the Broadway level, and the caissons are sunk by means of compressed air 35 feet farther to the rock. They pass through 12 feet of fine micaceous sand, layers of mud with sand, or silt, or clay mixed with sand, and a very hard conglomerate over the usual gneiss rock.

The caissons were sunk by excavating the soil beneath them from the inside, and by the weight of the brick piers simultaneously built upon them. To avoid an inflow of quicksand which might occur when the air-pressure was reduced by blowing out the semi-fluid material through pipes, it was decided in the beginning to remove all material in buckets through the air-locks, but upon trial it was ascertained that the pressure could be maintained while blowing out by running the compressor faster, and the soft earth was thus removed. It is to be noted that any flow of quicksand from outside the lines of the caisson might have caused settlements of neighboring buildings. When the caissons reached the rock they were filled solidly with concrete. They are proportioned to the maximum pressure allowed by the city regulations upon concrete, 150 pounds to the square inch. The brick piers are somewhat smaller, as they may be loaded to 200 pounds.

Nearly all the caissons have been sunk to place, and no appreciable cracks have occurred in adjacent buildings, one of which rests upon piles at the level of the general excavations the other on the natural soil several feet above.

The cost is said to be about 10 per cent of the entire cost of the building.

An interesting application of this method has been made by the same engineer-contractors, Sooysmith & Co., in founding the draw-pier of Seventh Avenue Bridge, New York. This is a circular pier 59 feet in diameter. Mr. Sooysmith's experience having convinced him that there was great risk of cracks in the masonry from irregular movements of a very large caisson, this one was made annular in plan, 59 feet in outside diameter, and 10 feet wide. When sunk upon the site, cemented to the rock and filled with concrete, it formed a coffer-dam within which it was expected to build the masonry "in the dry" after the water was pumped out. The sequence must be told. Seams in the rock bottom of the central space admitted water faster than it could be removed by pumps, and it became necessary to cover the bottom with a layer of concrete put in place under water to close the seams and permit the completion of the pier.

A commendable feature in the Manhattan Life Building is the symmetrical distribution of the loads upon each pier. Commonly the walls are built upon the outside edge of the property with footings entirely inside the thickness of the wall, concentrating upon the outer edge of the foundations pressures much above the average. In the Manhattan Life the supports are centrally or symmetrically placed upon the caissons, and strong steel girders extending from side to side of the building sustain the side-walls "in cantilever," if we may borrow a form of expression from the French.

The soil of Chicago is blue drift clay (a material having a great avidity for water), containing beds of quicksand and overlying solid rock at depths of 60 to 100 feet. The original surface of the soil was about 5 feet above the lake; the street grades are now about 10 feet higher. The upper portion is harder and more resisting than that immediately below, but it is probable that as the depths increase the soil is more compact, consolidated by the superincumbent weight. Nevertheless, upon this soil Chicago boasts some of the highest buildings yet erected. The methods of foundation vary. Formerly platforms of timber were used, bedded in the clay, and piles, rarely driven to the rock, but the great weight imposed by recent structures has caused more careful study, and while there is no consensus of opinion practice follows three general lines:

First, piles are driven to the rock and cut off below all future drainage that they may be always in the wet.

Second, detached foundations under each wall or pier with footings carefully proportioned in area to the weights to come upon them and to the resistance of the soil.

The best practice limits the weight to 3,000 pounds on the square foot, but this is frequently exceeded. Some settlement is expected and it is sought by proportioning of weights to surfaces as far as possible, to render the settling uniform. But the large masonry footings reduced by small gradations, form a pyramid of masonry and occupy much room. To redeem this space and make it available for use, advantage has been taken of the resistance of steel beams to transverse strains, and foundations upon beams and rails are now in common use.

The footings as before are proportioned to the weights. A bed of concrete is first laid down and upon this a course of beams. These, by reason of their lower price, are often railway bars. Upon them transversely, a narrower course is laid and then another until the bedplate of the pier is reached. The projection of each course beyond the one above it, carefully computed, is just what the transverse strength of the rail or beam will enable it to carry of the pressure on the foundation course.

This use of steel permits low and wide offsets to be made and reduces greatly the height of the foundation and in consequence the space it occupies. Four or five courses of rails and beams will not exceed a height of 18 to 30 inches, replacing 7 or 8 feet of masonry and giving so much more basement height.

The weight of the foundation is also less than if of masonry alone. In a specific case, the weight of the steel foundations was two-thirds

[1] A paper read by W. R. Hutton, M. Am. Soc. C. E., M. Inst. C. E.; M. Soc. des Ingrs. Civils, before the Congress of Architects of the World's Congress Auxiliary of the World's Columbian Exposition, Friday, August 4th, 1893, by courtesy of the American Institute of Architects.

that of the masonry and the saving in weight about 4 per cent of the load upon the pier. Each course of beams or rails is carefully bedded, filled-in and covered with concrete to protect the metal from rust.

To this method it is objected that some deflection however slight will take place in the beams when the total load comes on them, which will crack and break the concrete and destroy its efficiency as a protection to the iron. This, only a long experience can decide. From a computation of the deflections in a particular case the settlement of the central portion would appear to be about one inch more than at the corners, the diagonal length being 26 feet. Our knowledge of the elasticity of cement will not permit us to say absolutely what would be the effect upon it of this flexure. A more certain protection would be to inject the cement under pressure after the weights are on and the final deflection of the rails has taken place. In either case the rails and beams should be dipped in hot asphalt before being placed in the work, this having proved an excellent protection.

The stability of these constructions has been questioned. The material excavated from the wells hereafter described is as soft as glazier's putty, and will doubtless flow under pressure. While confined laterally it is, nevertheless, compressible and is compressed by the weight of the building and to a certain depth solidified. So long as the adjacent soil is undisturbed, no question but that the foundations will be safe. Experience, however, seems to show that the clay will flow, if not when the lateral resistance is removed, certainly when to this is added shock, as the jar from driving piles.

Some large buildings in Chicago have been erected upon a continuous platform of concrete covering the whole area of the structure. The serious irregular settlement of a prominent public building constructed in this way, accompanied by cracks in the walls and in the concrete platform, has brought the method into disfavor. It has been applied with better results when the platform has been made with iron beams, covered and protected with concrete.

It has been observed in Venice, a city founded on the marshy bottom of a lagoon, that many large buildings constructed in the fourteenth century and before, rest upon a platform of masonry, broader than the building it supports. The masonry itself rests upon a bed of puddled clay, which shows signs of a powerful artificial compression. These structures show no notable change, while many others of later date, built upon piles, show by numerous cracks the irregular settlements they have incurred. It is said that the tower of Saint Mark's does not rest on piles.

A different method has been adopted for a part of the foundations of the new Stock Exchange in Chicago. The foundation is generally upon piles about 50 feet long, driven into the hard clay which overlies the rock. Next to the *Herald* Building, however, which adjoins it, wells were substituted, lest the shock of the pile-driver close to its walls, should cause settlements and cracks. A short cylinder 5 feet in diameter, made of steel plate was first sunk by hand, reaching below the footings of the *Herald* Building. Then around and inside the base of the cylinder, sheet-piles, about 3½ feet long were driven and held in place by a ring of steel inside their upper ends.

The material inside the sheeting was excavated and a similar steel ring was placed inside their lower ends. By means of wedges, the lower ends of the sheeting were forced back into the soft clay until another course could be driven outside the lower ring. This operation was repeated until the excavation had reached the hard clay about 40 feet below the cellar. In this material the excavation was continued without sheeting, in the form of a hollow truncated cone to a diameter of 7½ feet and the entire excavation was filled with concrete. The wells are spaced about 12 feet. The loads upon them vary; some of them will carry about 200 tons.

The materal excavated was a soft putty-like clay to a depth of 40 feet, where a firm clay was reached deemed capable of carrying the weight proposed. The rest of the foundation is upon piles spaced 3 feet between centres, to be loaded with about 30 tons per pile, similar piles having been tested to 50 tons, at the Chicago Library foundation. They are driven with a Nasmyth steam-hammer without brooming, are cut off below lake surface, capped and filled-in with concrete. A series of short transverse I-beams distribute the load transversely and longitudinal beams prevent local settlements.

The interesting foundations of the Washington Monument at Washington, have heretofore been well described. The method adopted is indicated here in the belief that it is not very widely known.

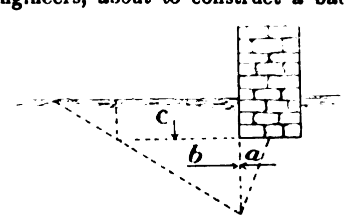
The National Washington Monument was commenced in 1848; in 1854 it had reached the height of 150 feet; in 1856, six feet additional were built. In 1878 the work which had been in the hands of the Washington Monument Association was turned over to the General Government and completed with money appropriated by Congress. The work as finally constructed is a plain shaft 500 feet high, with a pyramidion on top of 55 feet in height. It is 55 feet square at the base, about 30 feet at top and weighs over 90,000 tons.

The original foundation was of rubble masonry in lime mortar 23 feet 5 inches thick and 80 feet square at the base. The soil upon which it rested was a sandy clay. Thirteen feet below was a bed of gravel. The area of the base was too small and the soil under it was not sufficiently resisting to carry the final weight. A mass of concrete 13½ feet thick extending 23 feet 6 inches outside of the old base and 18 feet under it, increased the bearing-surface and carried it down to the gravel. The concrete extended 5 feet under the walls of the shaft itself. The construction of this block of concrete under a shaft 156 feet high and weighing 36,000 tons, was a delicate operation accomplished in this way: On the east and west sides, near corners diagonally opposite, cuts or trenches 4 feet wide and 13½ feet deep were made from the outer lines of the foundation and extended by tunnelling 18 feet under the base of the old foundation. When completed they were filled with concrete and other cuts opposite to them were made in like manner, carried under the old base and filled with concrete. The removal of so much bearing-surface in these two tunnels under the old foundation was sufficient to cause motion in the structure and after this but one cut was made at one time. The work was continued and completed by this system of narrow cuts, which were filled with concrete, until the entire sub-base was finished. After this 10 feet in thickness of the outer part of the old foundation was removed in sections 10 feet wide and replaced with concrete extending 10 feet out on the new base.

Gravel and sand are counted among the incompressible materials for foundations when prevented from spreading sidewise. The resistance to lateral spreading is usually furnished by the adjacent sand, and when this is insufficient, the surface rises as the building sinks.

Very interesting experiments upon this subject have recently been published by M. Yankowsky, a Russian engineer. The memoir of Rankine, upon "*The Stability of Loose Earth*" was published in 1856, and is the only attempt that has been made to apply the mathematical theory of the equilibrium of granular masses to the resistance of sandy soils under vertical pressure. It is but an approximation and of uncertain value, although when applied to the thrust of earth against retaining-walls, his theory gives results which agree fairly well with experience.

About the same time (1857) Professor Pauker, colonel of Russian engineers, about to construct a battery at Cronstadt, upon an artificial foundation of sand, first applied the theory of Coulomb and Poncelet to the problem of the resistance of sand to a vertical load. He considered the reaction between the prism-of-pressure *a* supporting any part of the load, and the prism-of-resistance *b* held in place by the superimposed earth *c*. He assumed that this pressure and reaction acted on horizontal lines.



His analysis based upon these considerations, led him to a formula identical with that of Rankine, although reached independently and by an entirely different method. The formula of Pauker has been in general use in Russia for thirty years to determine the depth of foundation of large works, chiefly of bridge piers, upon sandy, clayey and even silty soils.

From 1857 to the present time there have been no attempts, either theoretical or experimental, to increase our knowledge of the resistance of natural soils to *vertical* pressure, although the analogous questions of the thrusts of earth and the resistance of retaining-walls has during this period received a very considerable development.

Mr. Yankowsky's experiments were made by sinking prisms of wood, 8 inches wide and 1 inch, 2 inches, 3 inches and 4 inches thick into a mass of dry sand, the weight and angle of repose of which were carefully determined, and noting the pressures and the displacements of the sand, the results of over a hundred observations are given in the diagram annexed. His first discovery was that the formulas of Rankine and Pauker do not at all correspond with the results of experiment, while the general character of the diagram showed that the discrepancies were not due to any inaccuracy in the experiments, but to faults in the theory. Seeking the cause of this large disagreement, he naturally concluded that some loss of work took place during the phenomenon of the flow of sand, which had not been introduced into the formulas. Examining the triangular prisms of pressure and resistance (method of Coulomb) he was convinced that the lost work was in the friction between these prisms, for while the prism-of-pressure tends to sink, that of resistance tends to rise along its inclined base.

He then discusses the question analytically and finally represents his conclusions by the following approximate formula:

$$H = 2\,h.\ \frac{\left(\text{tangent}\ \dfrac{(45^\circ + \phi)}{2}\right)^2}{\text{tangent}\ \dfrac{(45^\circ - \phi)}{2}}$$

H = height of a column of earth representing the vertical pressure.
h = depth of base below the surface.
ϕ = angle of repose of the material.

The curve of the diagram herewith represents the exact analytical expression, the formula above is a simplification and an approximation and is represented by the straight line of the diagram, tangent to the curve.

The diagram shows that the results of analysis agree fairly well with those of experiment, but while this justifies the use of the formula to determine the resistance of a sandy soil, it does not prove the correctness of the theory of Coulomb and Poncelet upon which it is founded.

In fact the hypothesis of prisms of pressure and resistance bounded

by straight lines do not admit the introduction into the analysis of the equation of moments. For this reason, the theory does not conform to the actual facts, which are much more complicated, of the flow of sand under vertical loads. The observations established this in the most conclusive manner. The width of the prism-of-resistance never exceeded half the theoretical width. This circumstance together with theoretical considerations, led to the suspicion that the flow takes place along curved surfaces; which was fully verified by Professor Kourdemoff, who by means of a glass plate in the side of the vessel containing the sand was able not only to observe, but to photograph its movement.

The limiting curve between the particles which were undisturbed and those which were displaced showed that the prisms of pressure and resistance have for profile a continuous curve. The analytical determination of these curves is not at present practicable; and we are compelled to fall back upon the approximate theories, and experimental data. The theory here given is nearer to the real phenomena of flow, and the results agree with the observations better than any other theory up to the present time.

THE TRAIN-SHED OF THE MAIN PASSENGER-STATION, NEAR THE CATHEDRAL AT COLOGNE.[1]

THE train-shed has a length of 255 m. (837 ft.) and a breadth of 92 m. (292 ft.), covering an area in round numbers of 22,200 sq. m. (238,970 sq. ft.). The following table gives a comparison with the other large train-sheds of Europe:

Train-shed of Station.	Length. Feet.	Breadth. Feet.	Height. Feet.	Area covered. Square feet.
Frankfort-on-the-Main (3 train-sheds)	600	184	93	336,340
Cologne	837	292	79	238,970
Bremen	430	194	89	83,620
Anhalt in Berlin	550	199	112	109,630
Midland, Manchester	563	210	....	118,210
Union, Glasgow	520	198	90	103,080
St. Pancras, London	705	243	100	171,260
Cannon Street, London	656	190	108	124,870

The cross-section of the train-shed is formed by three spans, a middle span of 63.9 m. (209 ft.) and two side spans of 13.4 m. (44 ft.). The height of the middle part is 24 m. (79 ft.); this was made especially low on account of the proximity of the cathedral. The trusses of the central span are formed by arched girders in pairs, the two in each pair being 0.8 m. (2.5 ft.) apart, and united by both horizontal and diagonal braces. The ends of the arches are hinged on pins, and are supported on a narrow horizontal bed-plate which is restrained from moving in a horizontal direction.

The single trusses are for the greatest part of their length built as lattice-girders, but from the ends to a height of 2 m. (6.5 ft.) they have solid webs. The flanges have a T section, and to these the double diagonals are directly riveted. Upper and lower flanges are symmetrical. The distance apart of the trusses is 8.5 m. (27 ft.) from centre to centre. The roof-covering is supported by iron purlins of a I or Z section, which rest on the upper flanges of the trusses. The connecting joints are so arranged that they transmit only vertical forces, the purlins being able to change in length under changes of temperature. This is effected by having at every other panel where the wind-bracing is connected a continuous purlin with projecting ends to which the intermediate shorter purlins are joined by rivets in oval holes.

The wind-bracing consists of round steel rods which carry the wind-pressure on any truss to the masonry abutments.

The trusses support a spandrel structure on each side, the walls of which, 7 m. above the side spans, are glazed throughout their entire extent. To light the train-shed more completely an upper construction 35 m. (115 ft.) wide extends over the whole length with the exception of the two end panels. This upper construction is formed by single small saddle roofs which extend at right angles to the length of the shed, and by a serious of longitudinal window lights along the ridge. The side surfaces formed in raising these above the ridge form a ventilating louvre. For the same reason the covering above the trusses is slightly raised above the rest of the roof, so that side openings are formed where smoke and dust may have exit. In total, the openings for ventilation have an area of 1,600 sq. m. (17,200 ft.).

The ends of the train-shed are enclosed by framing attached to the end trusses and have ornamented windows. The wind-pressure acting upon these ends is transferred downward to a special girder.

The end trusses have a breadth of 4.1 m. (13.4 ft.), the others being only 0.8 m. (2.5 ft.). The end truss and the two trusses next to it are, at both ends of the train-shed, connected together by continuous purlins and by diagonal members, thus forming a rigid system, which is firmly connected for a length of 21 m. (68.8 ft.) to the end abutments, but which is allowed motion on the other four abutments under expansion from temperature.

The trusses of the side spans consist of arched girders, the lower chord of which is so elevated that the pressure line in the upper chord under uniformly distributed load has the same circular form as the chord itself. Against unsymmetrical loads these arches have a moment of resistance amply sufficient.

The roof-covering is supported by Z-beams. On the crown of each side span there is a longitudinal louvre which serves both for lighting and for ventilation. All the roof-covering is of corrugated-iron.

The glass of the roof-lights has a thickness of 6 mm. (0.24 in.). The glass plates extend the entire width of the opening, the edges lying upon galvanized-iron gutter-plates, and are connected by screws passing through —⌒— springs between them. In order to avoid stresses in the glass, pieces of felt are placed between it and the springs, and the felt is protected from dampness by being wrapped in tinfoil.

At each end of these upper windows in the direction of the length of the train-shed is placed a ladder which, on one side of the building, is connected with steps leading downward.

The erection of the train-shed was done under difficulties, since the work had to be carried on without disturbing the movement of trains and passengers on the tracks and platforms below. For an erection-staging an iron structure 38.85 m. (127 ft.) in span was provided which had three trusses 5.5 m. (18 ft.) apart; these were firmly united by diagonal and lateral bracing. This staging was supported by 11 pair of wheels on a track on each side, so that it could easily be moved in the direction of the length of the building as the work advanced. The staging was so managed that it did not in any way hinder the temporary structures or the erection of the waiting-room building.

The movement of the staging, whose weight was about 140 tons, was effected very simply by 16 laborers with crowbars on each side, the time required to move it from one truss to the next, a distance of 8.5 m. (27 ft.), being from 45 to 60 minutes.

The total weight of the ironwork of the train-shed, exclusive of corrugated-iron, is about 3,130 tons (6,900,500 lbs.). This amounts to 160 kg. per square metre (32.8 lbs. per square foot) of floor-area for the large span, and 90 kg. per square metre (18.40 lbs. per square foot) for the side spans, the latter including the ironwork of the side wall on Maximinen Street.

[1] Extract from a paper by F. Lohse, read at the International Engineering Congress of the Columbian Exposition, Chicago, 1893.

BOOKS AND PAPERS

ENTHUSIASM is always contagious, and when a writer like Mrs. Van Rensselaer, who is so facile with her pen and so perfectly competent to discuss matters of art in general and architecture in particular, undertakes to write about landscape-gardening, the enthusiasm which she throws into her descriptions and criticisms is so contagious that no one who is at all moved by art-impulses can read, even casually, her recent book on the subject[2] without being convinced that we, as a nation, are wofully deficient in a just conception of the natural beauties which can be harnessed to the service of architecture, and that the proper course for each of us who has the slightest regard for Art — with a capital A — is to immediately proceed to plant shrubs and flowers about our individual domains, and to take a hand in the elevation of the country to a proper appreciation of nature's glories as applied to human habitations. The author has written upon many artistic subjects, though never more entertainingly than in this volume, nor with a more comprehensive treatment of the theme, which she has evidently mastered in its fullest details, without losing any of the freshness of conception which can render such a topic so delightful, and the enthusiasm for the subject is so apparent that it is more than forgiven even when carried to the length of naively citing a contemporary artist as not only standing at the head of his profession in this country, but as being absolutely the best the world has ever produced. We have a great respect for Mr. Olmsted's great genius, and appreciate the services he has rendered not only to his own profession, but to architecture as well, while his crowning work at Chicago this year has certainly demonstrated the range of his capabilities; but though he may actually be what Mrs. Van Rensselaer assumes, the greatest landscape-gardener the world has ever produced, it seems to flavor just a trifle of the self-esteem which our English cousins are so fond of quoting as a peculiarly American trait, for any one to assert so much for a living compatriot.

A few quotations will, perhaps, best illustrate the bright, effective manner in which the subject has been treated. In regard to what landscape-gardening is popularly assumed to represent in the minds of a great many people: "Nowhere better than at Newport can we understand what a French artist meant when he said that most people's idea of gardening is the clearing-up of spontaneous vegetation, followed by the accumulation of strange and dissimilar objects. Most people, in truth, go to work in their gardens as they would in their houses if they should bring in a bric-à-brac dealer's stock and arrange it after the method which prevailed in his shop. Such a house would not be fit to live in, and the majority of our small gardens are not fit to look at." This is so manifestly true that it must appeal to every one who thinks for a moment. Mrs. Van Rensselaer is wholesale in her condemnation of the style of gardening which finds expression in the Boston Public Garden, or, still worse, in the South Park in Chicago, where admiration is compelled for the

[2] "*Art Out-of-Doors*," Hints on Good Taste in Gardening. By Mrs. Schuyler Van Rensselaer. New York: Charles Scribner's Sons.

ingenuity of the gardener in fashioning all manner of curious shapes, terrestrial and celestial, in bulbs and growing flowers, though the utter lack of art-feeling throughout the whole is painfully manifest. The book should be read carefully by every architect, especially taking to heart the portion which considers specifically the interdependence of architecture and landscape-gardening. "A professed landscape-gardener — I cannot say it too often — will almost invariably be needed when a naturalistic scheme of any extent is desired; but every architect ought to be able to design a small, formal garden, and every gardener ought to be able to develop it. Neither the average American architect nor the average American gardener has this power to-day, but that is merely because neither of them has learned his own trade properly. Every architect ought to know something about the requirements of the surroundings of a home, but few of ours even know how to choose its site reasonably well."

The book is not written for any class; it is not a professional work, but it is a plain, straightforward appeal from one who has studied the subject, and who appreciates the possibilities as well as the difficulties, addressed to every one who has a house or a garden plot, and wants to unite the two in a proper manner. It is in no sense technical, and if one contemplates only a bed of rose-geraniums against a terrace-wall, or a single cluster of nasturtiums against the side of a piazza, the planting would be done to a better effect, more intelligently, and with a great deal more satisfaction after having read this book, while, for the larger treatment of public parks and driveways, the book is almost unique. In fact, a perusal of the final chapter in regard to the books on gardening-art emphasizes the scarcity of literature on this subject either in English or foreign tongues. It is to be hoped that Mrs. Van Rensselaer's book will have all the influence on our country and suburban landscape and architecture which the subject merits.

MISS BEALE is so well-known to the readers of the *American Architect* that her book on "*The Churches of Paris*,"[1] seems quite familiar, especially as a considerable portion of it has already appeared at intervals in the columns of this journal, though the scope of the book is very much enlarged and extended. The work is in no sense an architectural guide, but is rather an historical and archæological description of the Paris churches, the architectural descriptions entering as mere incidents rather than as principal features. The first perusal reveals one or two rather unexpected facts. The list of edifices omits all of the more recent churches, such as St. Augustine, the Trinity, or St. Pierre de Montrouge, but in addition to these there are in Paris more than fifty churches all of which are described, seven of them bearing the name of Notre Dame. This seems like a good many religious edifices even for so large a city, but when it is remembered that previous to the Revolution, when Paris had less than one-third the number of its present population, there were three hundred and eleven religious foundations in the French capital, the present number does not seem so numerous. The book is quite freely but rather unfortunately illustrated. In these days of clean, sharp drawings, and excellent photographic reproductions, there seems no excuse for such poor work as abounds in this book, very little of which is in any sense worthy of the subjects. But aside from the illustrations the subject-matter is admirably treated and without being architectural is very readable, so that one is tempted involuntarily to read about church after church in spite of one's self. The author has evidently written *con amore* and the delightful legends, the half-forgotten lore and the quaint miracle stories are brought out so delightfully that a perusal of the book is almost equivalent to a visit to the structures themselves. One can hardly agree with some of the statements regarding the architecture, indeed, it is questionable whether the work would not have been more interesting to architects if architecture had been entirely left out of it, for one's antagonism is aroused by such a left-handed assertion as that the interior of the Panthéon, for instance, is "*no doubt* good"; nor would many architectural students admit that the abbey-church of St. Denis is "the finest in or near the metropolis and one of the grandest examples of French thirteenth-century architecture," nor that the only thing needed to make it perfectly beautiful is new stained-glass in the windows of the clerestory. And in describing the Cathedral of Notre Dame we are told that "the original design of the church did not comprise the chapels which connect the nave and somewhat spoil the effect of the exterior." There is room for considerable divergence of opinion on that subject. Some even go so far as to maintain that the most interesting architectural effect of the cathedral is obtained from the rear, and that the cleverest arrangement of plan is manifested in the disposition of the *chevet*. The writer evidently has a preference for the Mediæval work, and the Renaissance, of which there are certainly some excellent examples in the city, receives but scant justice at her hands. She dismisses almost the entire architectural effect of the Madeleine with the faint-hearted remark that "what the interior lacks in beauty as regards sculpture and painting, it possesses in its marble walls and its carved woodwork." On the other hand, the decorative paintings in the Panthéon are very fairly criticised both for themselves and for their effect in relation to the church, and a very clever appreciation of the work of Puvis de Chavannes is manifest when his paintings are characterized as pagan Renaissance. Altogether, the book is an excellent aid to a proper appreciation of the archæological and artistic treasures of the French churches and an admirable descriptive guide-book, tinctured with a slight architectural flavor.

[1] "*The Churches of Paris*," from Clovis to Charles X, by S. Sophia Beale, W. H. Allen & Co., limited, 13 Waterloo Place, London.

SOCIETIES

ENGINEERS' CLUB OF PHILADELPHIA.

AT the business meeting, held October 7, 1893, President John Birkinbine in the chair, sixty-two members and visitors were present.

The Committee on Visitors presented their report upon the recent visit of members of La Société des Ingénieurs Civils de France. About forty-seven members of that society reached the city on the afternoon of September 26th, under the escort of the sub-committee, and they concluded their visit and left for New York on the evening of the 28th. There was every reason to believe that their stay in this city was thoroughly enjoyed and that they carried with them many pleasant remembrances.

Mr. John Birkinbine gave a description of the exhibit of Fried. Krupp, of Essen on the Rhur, Prussia, at the World's Fair:

In a separate pavilion on the lake shore, constructed of iron and ornamented with sculpture and stucco, also provided with all necessary machinery, boilers, draught stack, etc., is displayed a large collection of guns, gun-carriages, projectiles, armor-plate, forgings, moulded steel castings, pressed and forged steel articles, etc., made at the Krupp Works.

In addition to these exhibits in the pavilion is a coast gun 16.54 inches bore, length 49.93 feet, mounted on a Pennsylvania Railroad truck, to which it was handled from the vessel by the new crane of the Maryland Steel Co. This gun, with breech closure, weighs 120.46 tons, and carries a charged projectile weighing about 2,500 pounds and driven by 900 pounds of brown powder. It is claimed to be able to penetrate at 2,200 yards a wrought-iron plate 3 feet thick, placed at right angles to it.

Among the cannon in the pavilion are a 12-inch gun, with barrel 35 feet long, mounted on a hydraulic ship carriage, and weighing, with shield, 126.5 tons; a coast gun 9.5 inches in diameter and 29 feet long, mounted on a centre-pivot carriage, and arranged so as to be elevated 45 degrees. This has the longest range of any gun with the same conditions. A shot was fired from it in 1892, in the presence of the Emperor of Germany, and the measured range was found to have covered over 12 miles. The path of this shot has been graphically shown in its relation to Mount Blanc, and the statement is made that if fired at Pre St. Didier in the Alps, at an elevation of 3,280 feet above the sea, it would cross 9,000 feet above the 16,000 feet summit of Mt. Blanc, and land over 12 miles away, near Chamounix.

Among the examples of rolled-plate metal exhibited is a plate of ingot-iron for an hydraulic bending-press, which is 27 feet long, 10.25 feet wide, and 1 foot thick, weighing 61.5 tons; a boiler-plate 65.5 feet long, 10.83 feet wide and 1.25 inches thick, weighing 16 tons; and a boiler-head 12.75 feet in diameter and 1.5 inches thick, weighing 3.33 tons.

Among the forgings may be mentioned a hollow shaft, forged by hydraulic power from a block of crucible steel, 49 inches in diameter and 8.8 feet long. This shaft is 12 inches in diameter and has a length of 82 feet, and is bored out longitudinally to a diameter of 4.33 inches on a lathe with a bed 111.5 feet long. The weight is nearly 12 tons.

Some castings worthy of mention are a moulded steel stern-post for an armored vessel, weighing 12.6 tons, and the companion rudder-frame, weighing 11.125 tons. The large size of these two articles, the latter of which requires a space of 26 by 17.5 feet, made transport by rail impossible, and they were therefore carried to the Rhine by teams, and thence by water to Chicago. There is also a propeller screw having a total weight of 26 tons.

The chimney belonging to the pavilion is 88.5 feet high, with an interior diameter of 3 feet, built of shaped brick with vertical perforations, the bricks being capable of bearing a pressure of over 5,000 pounds per square inch. It is claimed that these perforations increase the adhesion to 61.5 pounds to the square inch as against but 34.75 pounds in solid brick, thus insuring stability.

The pavilion is also equipped with machinery to furnish power for handling the large guns.

Mr. Birkinbine's remarks were illustrated by photographic slides, projected by the lantern, and by sketches on the blackboard.

At the business meeting, October 21, 1893, President John Birkinbine in the chair, forty-six members and visitors were present.

Mr. John C. Trautwine, Jr., described some lantern-slides, illustrating the exhibit of the Pennsylvania Railroad at the World's Fair. These included the general appearance and construction of the building, the system of track-laying, pneumatic signaling from block-stations, illustrations of the mileage of this road, which in a single track would more than encircle the earth, and of the relative value and speed of passenger and freight cars and rolling-stock.

There were also interesting models showing, by comparison, the

cubical contents of the ballast now in use on the road, and the length of track which the capital stock of the company would cover if laid out in tangent silver dollars; a reproduction of the bill of lading for the "John Bull" engine and boiler, dated Liverpool, July 14, 1831, and of a bill for T-rails shipped to the Camden & Amboy Railroad during the same year. Pictures of this old locomotive and of the type of passenger-cars used on that road were also shown and described.

Mr. John Birkinbine described the movable sidewalk on the pier at the World's Columbian Exposition, with the assistance of lantern views showing its general appearance and details of the construction and method of operation. He also showed and explained a photograph of the pyramid exhibited in the Mines and Mining Building, composed of cubes of the different minerals in the relative volumes produced in the United States in one second. He also commented upon a number of slides showing the column of Edison incandescent lights in the Electricity Building, and some of the most important engines and dynamos in that and in the Machinery Building.

The Secretary exhibited a large suite of slides showing the exterior of the Exposition Buildings that were not included in those shown at the last meeting, many of the more important exhibits in the buildings, and scenes in the grounds and Midway Plaisance, with descriptions of the various points of interest connected therewith.

L. F. Rondinella, *Secretary.*

ILLUSTRATIONS

[*Contributors of drawings are requested to send also plans and a full and adequate description of the buildings, including a statement of cost.*]

EDISON ELECTRIC ILLUMINATING COMPANY'S BUILDING, 26TH STREET, NEW YORK, N. Y. MESSRS. BUCHMAN & DEISLER, ARCHITECTS, NEW YORK, N. Y.

[Gelatine Print issued with the International and Imperial Editions only.]

HOUSE FOR —— ESQ., NEW YORK, N. Y. MESSRS. CARRÈRE & HASTINGS, ARCHITECTS, NEW YORK, N. Y.

HOUSE FOR MR. YOUNG, ST. LOUIS, MO. MESSRS. EAMES & YOUNG, ARCHITECTS, ST. LOUIS, MO.

HOUSE FOR L. FRANK OTTOFY, ESQ., ST. LOUIS, MO. MR. A. BLAIR RIDINGTON, ARCHITECT, ST. LOUIS, MO.

DOORWAY OF THE "LONGFELLOW," CAMBRIDGE, MASS. MR. C. HERBERT MCCLARE, ARCHITECT, CAMBRIDGE, MASS.

THE MERCHANTS' BANK BUILDING, BALTIMORE, MD. MESSRS. BALDWIN & PENNINGTON, ARCHITECTS, BALTIMORE, MD.

[Additional Illustrations in the International Edition.]

VIEW FROM THE COLONNADE LOOKING NORTH, WORLD'S COLUMBIAN EXHIBITION, JACKSON PARK, CHICAGO, ILL.

[Gelatine Print.]

STATUE OF COLUMBUS, IN FRONT OF THE ADMINISTRATION BUILDING, WORLD'S COLUMBIAN EXHIBITION, CHICAGO, ILL. MR. AUGUSTUS ST. GAUDENS AND MISS M. T. LAWRENCE, SCULPTORS.

[Gelatine Print.]

HEWELL GRANGE, BROMSGROVE, ENG.

CHURCH OF ST. COLUMBA, WANSTEAD, ENG. MR. E. P. WARREN, ARCHITECT, WESTMINSTER, ENG.

The church at St. Columba, now in course of building at Wanstead Slip (Stratford, E.), is calculated to seat eight hundred people. It is a plain building faced externally with red brick, and having an internal arcade of the same material. A large contribution has been made from the Bishop of St. Albans fund towards the cost, which will be about £6,000.

TWO HOUSES AT MIDDLETON, ENG. MR. EDGAR WOOD, ARCHITECT.

The houses shown in the illustration are faced with Ruabon work in brick, bands, sills, etc., the stone being concentrated round the front entrance. The roof is covered with five colors of slates, small size, laid random, and blue-ridging. The whole of the interior woodwork including mantels, is yellow-pine treated with transparent paint, which allows the grain of the wood to be still seen, and at the same time takes away the rawness of the wood. The upper portions of many of the windows are filled with stained-glass, the designs of which have been taken from local growth.

ST. NICHOLAS CHURCH, PRAGUE, AFTER A DRAWING BY SAMUEL PROUT.

NOTES & CLIPPINGS

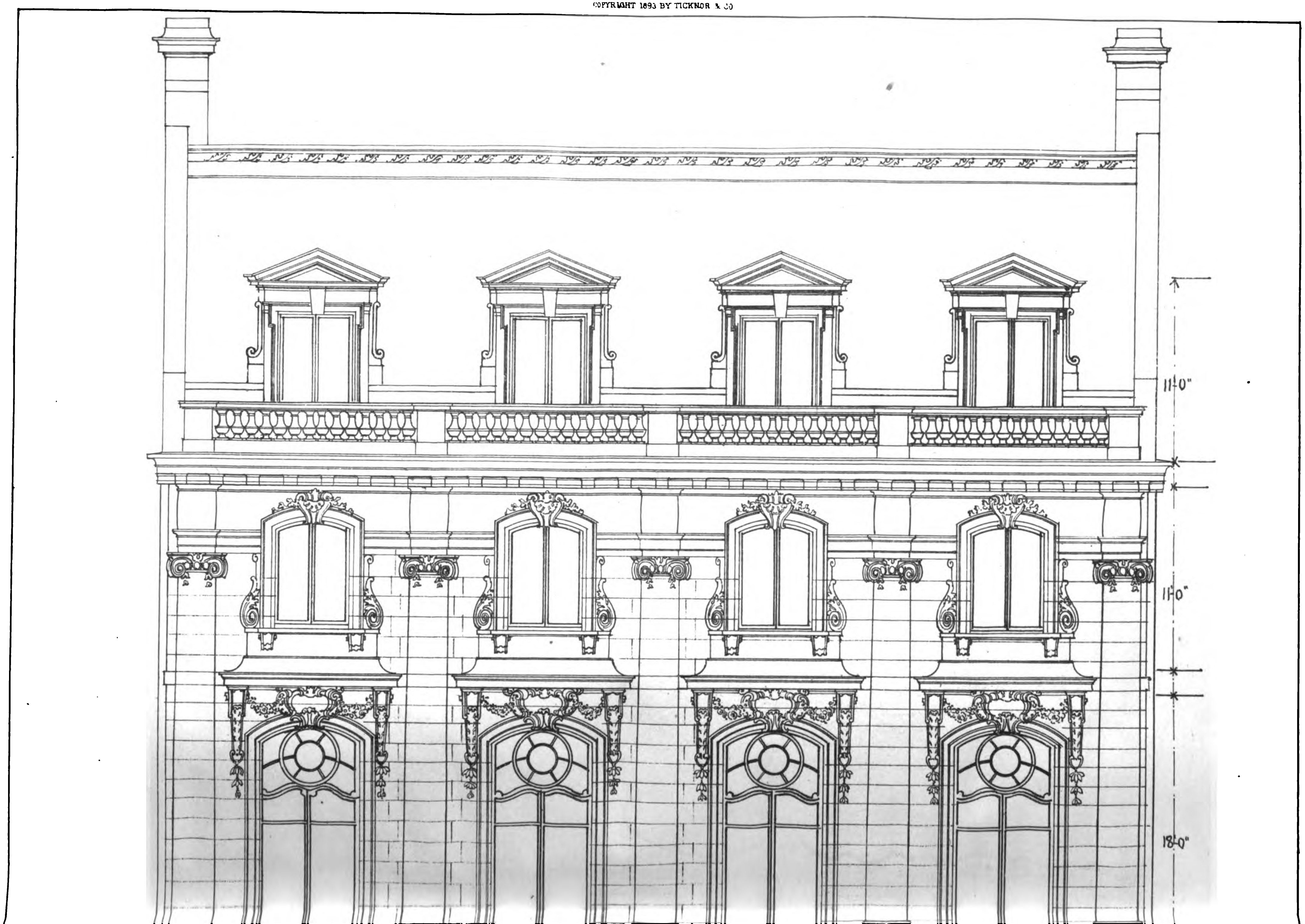
Taking Down the Spectatorium at Chicago.—The work of removing the immense Spectatorium Building is being done by the Chicago Wrecking Company. "There are 400 tons of steel beams in the building," said President Harris this morning, "but the amount of building-material in the pile is very hard to estimate. If it requires good engineering skill to erect such a building as the Spectatorium, I am quite sure it is an equal feat of engineering to take it all down again. Special machinery is requisite to get the big girders down from their present position. The work is of a very dangerous character. Some of the men we employ are experts in their line. A good house-wrecker, as we call him, earns from $6 to $8 a day. We have a man on every job of importance constantly patrolling the building and repairing every spot which shows signs of weakness. If there is any place which he cannot repair, he instantly reports to headquarters. Work is then at once stopped and the building made safe before our men are allowed to again work on it." Mr. Harris was asked what time it would take his company to remove the Spectatorium, and replied: "It will take at least three months, but these things are as uncertain as the sale of the salvage. I shall try and dispose of the steel on the ground, and I have offered it all at $20 a ton, which is cheap considering the character of the material put into the building. If I can't get this sold that way, it will have to be all broken up for scrap. So you see I may stand to lose considerable there which I shall have to make up in other ways." — *Chicago Journal, October* 12.

The Ownership of the Gold Deposits in Maryland.—An article on the presence of gold in the Appalachian region of Maryland which was recently printed in a Baltimore paper recalled to a lawyer of that city the fact that the United States Supreme Court has decided that all deposits of gold and silver in Maryland belong to the State and not to the owner of the land in which they lie. He cites as authority the case of Shoemaker *vs.* the United States, in the last published volume of Supreme Court reports (147). The plaintiff had been the owner of land in the District of Columbia which was condemned for park purposes. He alleged that there was a deposit of gold on it, which he contended did not pass to the Government by the condemnation proceedings. The land in question was formerly in Maryland and was included in the grant by Charles I to Lord Baltimore. This grant specifically conveyed to Lord Baltimore all the mines, minerals and ores in the land covered by the grant, he paying the crown a royalty of one-fifth of the minerals, gold, silver, etc., that might be mined and utilized. Lord Baltimore made many conveyances, and the one of the tract held by Shoemaker among them, reserving to himself all the minerals that might be in the lands conveyed. The Supreme Court (opinion by Mr. Justice Shiras) held that no right to the gold and silver and minerals passed to the purchasers of these tracts, but that they remained in Lord Baltimore and his successors, subject to the royalty to the crown, and that such proprietary right passed to the State of Maryland when Lord Baltimore's grant was confiscated, and subsequently to the United States when Maryland ceded to them the land of which Shoemaker's tract was a part.—*N. Y. Evening Post.*

The Story of a Bacchus.—The venerable but still fascinating *raconteur*, M. Auderbrand, relates a little history in the last number of *L'Art* which explains the cause which has deprived the world of many a valuable example of ancient art. It appears that the late Prosper Merimée, who was the soul of the French department for the restoration of buildings, once went on an official visit to Bourges. In the neighborhood he heard about a place called "Cæsar's Camp," from which many strange objects were derived. As in duty bound he went there, and arrived at a moment when a fine statue of "Bacchus" was exhumed. He could not well explain his official position to the rustics, so he appealed to their greed by telling them that the figure, if brought to Bourges, would reach a good price. He proposed to go in search of a conveyance. Visions of the excitement that would be caused by his discovery floated through Merimée's mind — for he considered the "Bacchus" as a rival to the "Venus of Melos," with the additional attraction of being to some extent a French work — and lightened his toilsome journey on foot. After some hours' delay he returned with a carriage to Cæsar's Camp, but his chagrin can be imagined when he found that the statue no longer existed. A peddler arrived soon after the departure of Merimée, who also displayed an interest in the figure, not on account of its beauty or antiquity, but solely for its value as old metal. He at once struck a bargain, paid fifteen francs, ordered the laborers to smash the figure, improvised a furnace, and had nearly completed the melting of the "Bacchus" into materials for spoons and ladles before Merimée returned. The moral to be drawn is that archæologists should lose no time to secure possession of anything precious whenever they have the chance.—*The Architect.*

A Costly Mosque in Damascus Burned.—The principal mosque of Damascus was burned to the ground, late in October, causing a loss of $2,500,000.—*Exchange.*

S. J. Parkhill & Co., Printers, Boston, U. S. A.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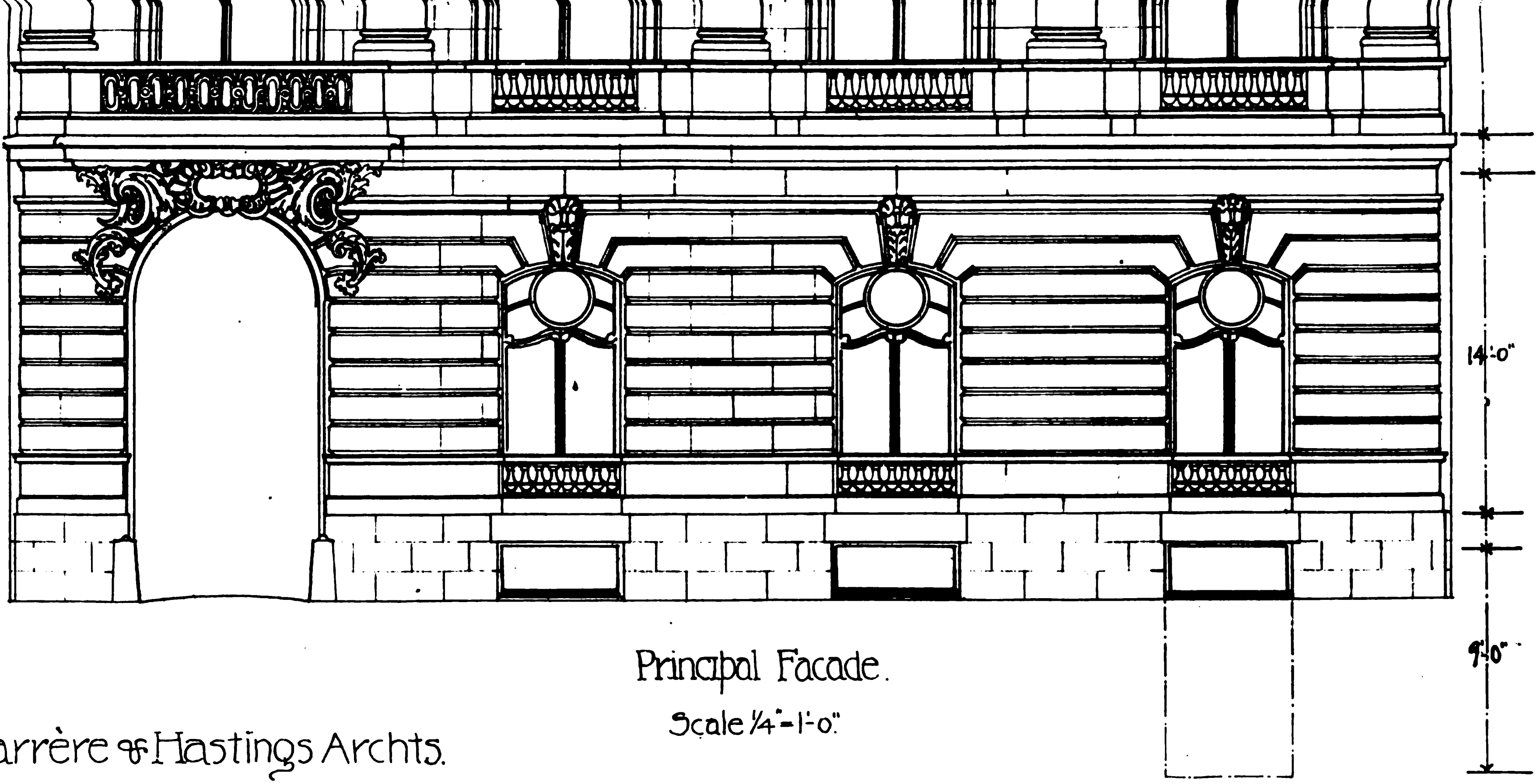


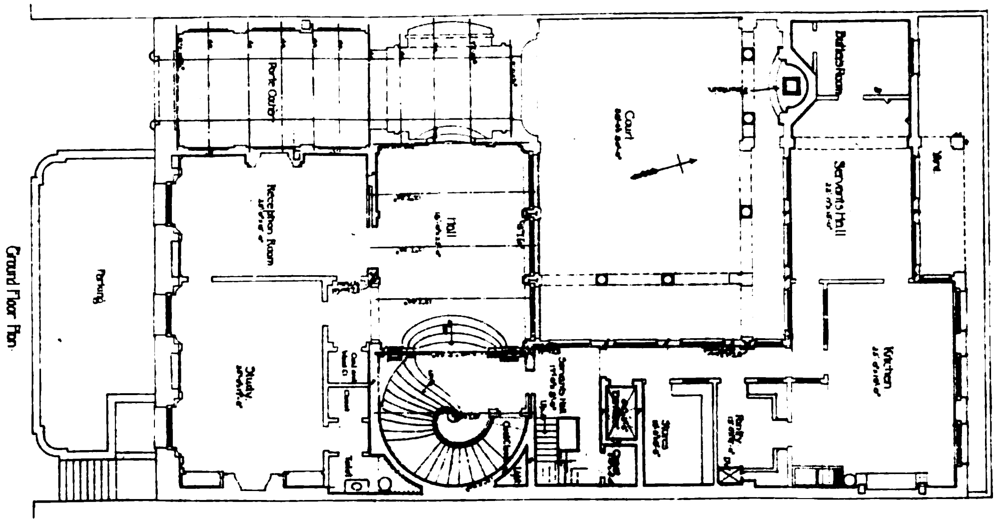
Principal Facade.

Scale 1/4"=1'-0"

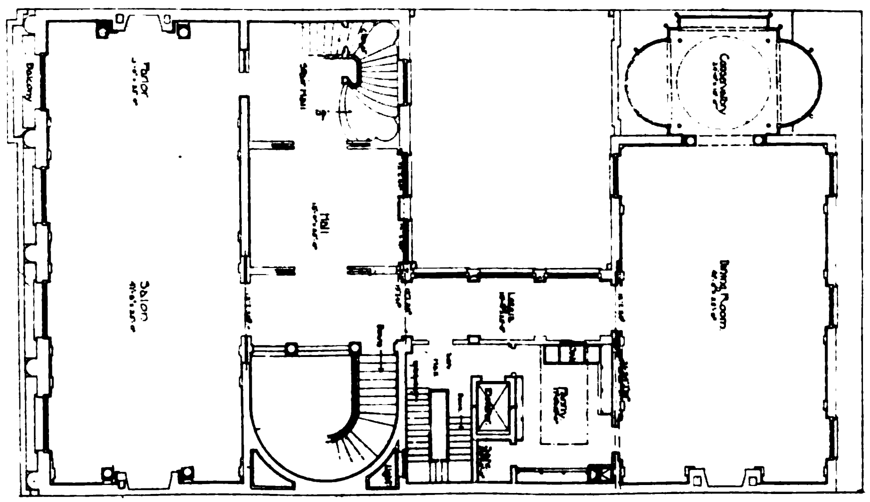
Carrère & Hastings Archts.

44 & 46 Broadway. N.Y.

House for



Ground Floor Plan.

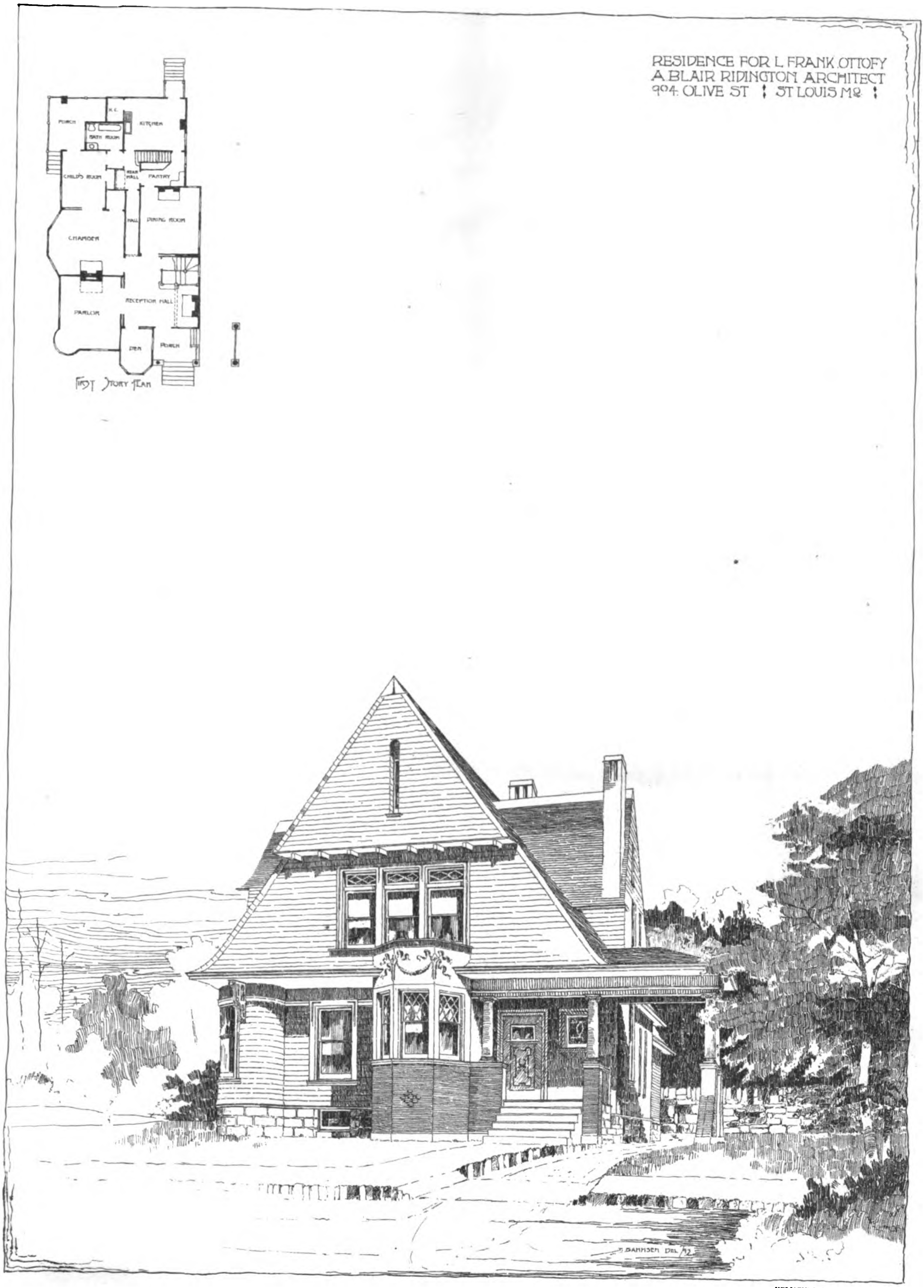


1st Floor Plan

HELIOTYPE PRINTING CO. BOSTON

HOUSE FOR Mr YOUNG NEAR ST. LOUIS
EAMES AND YOUNG ARCHITECTS

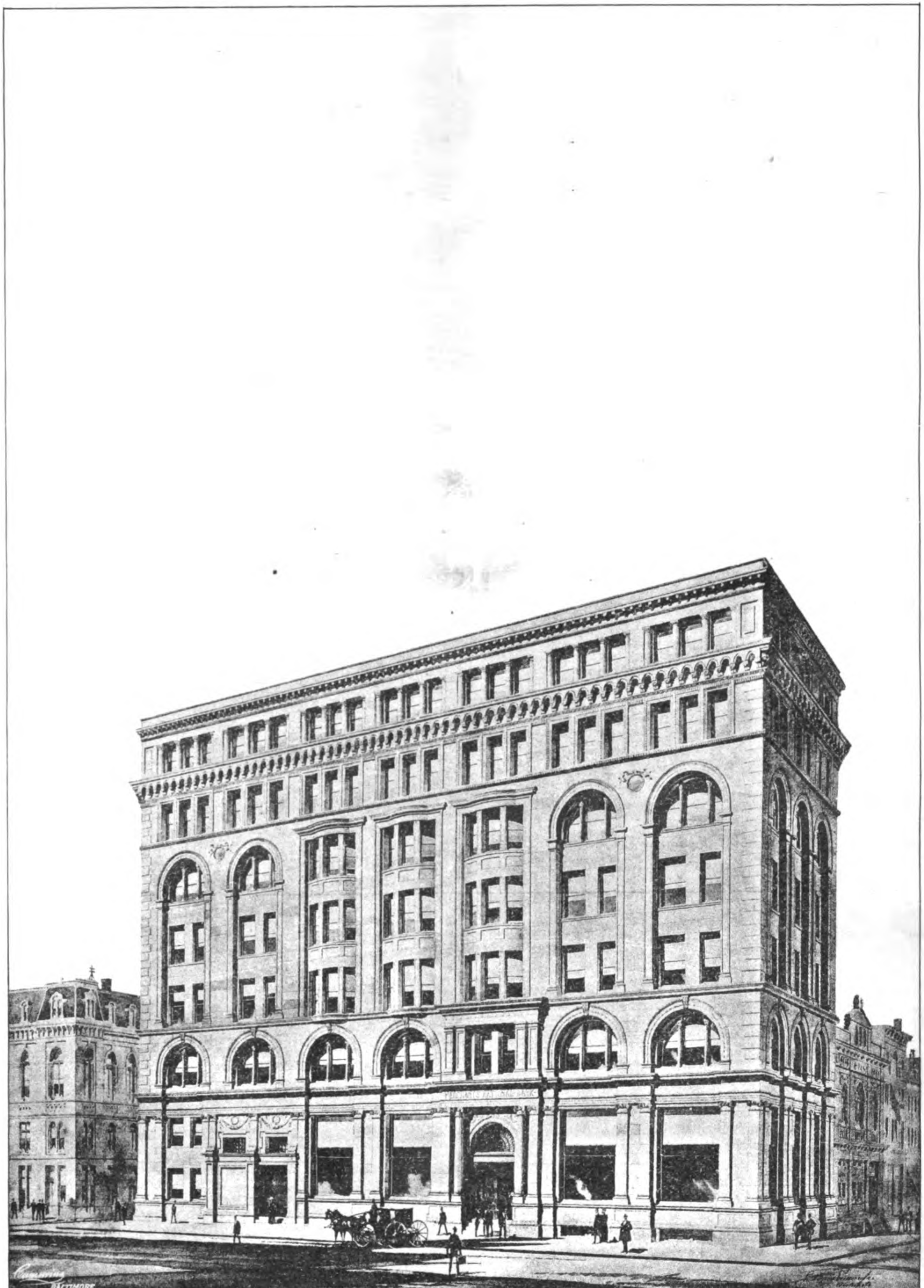
AMERICAN ARCHITECT AND BUILDING NEWS, NOV. 18. 1893. NO. 934.



HELIOTYPE PRINTING CO. BOSTON

ENTRANCE TO THE "LONGFELLOW"
APARTMENT HOUSE
FOR DR. GEO. R. SOUTHWICK, CAMBRIDGE. MASS.
C. HERBERT McCLARE, ARCH'T. CAMBRIDGE.

HELIOTYPE PRINTING CO. BOSTON



MERCHANTS NATIONAL BANK BUILDING · BALTIMORE MD ·

HELIOTYPE PRINTING Co. BOSTON

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NOVEMBER 25, 1893.

CONTENTS

WE can make a suggestion for facilitating rapid transit in the "congested district" in Boston, by a measure which we will warrant to be extremely effective, and which will involve no expense, to the city or any one else. A person accustomed to New York streets, and, still more, to the streets of foreign cities, cannot fail to be struck, in visiting Boston, first, with the narrowness of the sidewalks, and, next, with the incredible number of teams which are allowed to stand, often for hours, in the roadway, reducing the space for traffic to the room which their proprietors condescend to allow between them. Perhaps the very heart of the "congested district" may be taken to lie in the region extending from the Post-office to Tremont Street. The most direct, and most crowded thoroughfare through this region is by the way of Water, Washington and School Streets, yet in the busiest part of the day, between twelve and two o'clock, there are always to be seen, in the sixty-five rods of street between Tremont Street and Post-office Square, from twenty to forty teams, drawn up on each side of School Street, Washington Street and Water Street, deserted by their drivers, with the horses anchored to the sidewalk by a weight, or, perhaps, munching oats out of a nose-bag, if, indeed, they have not been taken out of the shafts altogether, and led away for refreshment, as often happens. If these were wide streets, or if there were no open places near where team-horses could be fed, some apology might be made for this abuse of the public highway, but they are all narrow, and crowded with foot-passengers, who jostle each other off the sidewalk, for want of the room which is taken away from them, to be utilized for the refreshment of the team-horses, who might just as well enjoy their Nirvana in the neighboring Post-office Square, or Court Square, or Adams Square, where they would not be in anybody's way. There is, possibly, something to be said in favor of allowing carriages to stand in front of the Parker House, although no carriage is allowed to stand in the public street in front of a London or Paris hotel in the business region; but the half-dozen carriages in front of the Parker House would give comparatively little trouble if they were not supplemented by a stationary row of vehicles of all sorts in the shade of King's Chapel, on the opposite side of the street, which reduce the available roadway to the space between them, and the example which is set at the Tremont-Street end is followed by teamsters through all the rest of the street. In Water Street the case is worse still. The street is narrow, at best, and the space left between the two rows of sleepy team-horses is not rendered any more navigable by the continual arrival at the *Journal* building of wagons loaded with paper or beer, which are coolly stationed across the roadway, while their contents are rolled over the sidewalk into the cellar. As this street forms the principal access from Washington Street to the Post-office, the people among whose legs the beer barrels and paper packages are rolled or slid are counted by myriads, and as the blockade of teams in the roadway makes it difficult to escape from the sidewalk into the busy Boston-man's ordinary thoroughfare — the gutter — there has been for many years a chronic demand on the part of the public for the widening of the street, apparently with a dim idea that this would in some way help the matter. Not long ago, the Mayor had to interpose to prevent the city from taking land for this widening, at a cost of something like a million dollars, the abutting land being the most valuable in the city. It is a curious illustration of Boston methods of dealing with streets that, at the very time that the City Council was discussing the question of paying two hundred dollars per square foot for land to widen the Water-Street roadway, a certain teamster is said to have held a license to keep two teams standing in the street through business hours. As we have not yet heard of the revocation of the license, it may be interesting to consider the value of the concession which this teamster enjoys. If his wagons are small, the length of each entire team may not be more than eighteen feet, so that, if he conscientiously backs up one of his wagons until its tail-board touches the nose of the horse of his other team, the united length may not be over thirty-six feet. Supposing the width occupied to be six feet, which is also a scanty allowance, the total area granted to the teamster amounts, as a minimum, to two hundred and sixteen square feet. At two hundred dollars a square foot, which is said to have been the price actually paid for the abutting land, the value of the teamster's concession is forty-three thousand two hundred dollars, as measured by the sum which the city was ready to pay to buy additional land for street purposes, in order not to have to disturb him; or, reckoning in another way, at five per cent interest the city pays twenty-one hundred and sixty dollars a year for the privilege of having the teamster's wagons obstruct its street. By either method of reckoning, the city, in our judgment, pays too much for the advantage that it derives from the transaction, and it would be decidedly the part of economy and common-sense to revoke the license, and oblige the favored teamster, as well as all other teamsters, to refrain from using "congested" streets as places of pasturage and recreation for their horses. If the teams in the "congested" streets could be kept moving, the sidewalks might easily be increased in width to the proportion adopted in other cities, to the immense relief of the foot-passengers, who enjoy a disproportionately small share of the privileges of the Boston streets.

THE *Deutsche Bauzeitung* devotes one of its charming biographical notices to the late Antoine Nicolas Bailly, who, it will be remembered, died a year or two ago, mourned by the whole profession, of which, by reason of his great attainments, his noble independence of character, his venerable age, and his countless kindnesses to his younger brethren, he was, in France, justly regarded as the head. Bailly, it seems, had a singularly varied and interesting career. His father was courier to the Cabinet under the First Empire. He lost his place on the fall of Napoleon, but, after the Restoration, found employment in a humble capacity in the postal service. Antoine, who was born in 1810, was the eldest of eleven children. His father's modest circumstances only allowed him to send his son to the public schools, and, at the age of seventeen, he was placed as a pupil in the office of an architect at Versailles. From his first master he does not seem to have learned much, but he was soon transferred to the *atelier* of Debret, in Paris. In 1829, Duban succeeded to Debret's practice, and, a year later, young Bailly was admitted to the School of Fine-Arts. Like many other pupils of the school who have subsequently risen to great distinction, Bailly was obliged to earn his living by outside work at the same time that he carried on his school studies. He took, naturally, such employment as offered, and, besides working as draughtsman in various offices, he found time to assist Létarouilly in the preparation of his splendid volumes of engravings of the Italian Renaissance. In 1834, his father was retired, with a small pension, and from that time the elder brother was the main support of the family. He could no longer think of a school course, every moment of his time being required for the work by which he must earn bread-and-butter for his brothers and sisters. To add to the demands upon him, he was drawn

for the National Guard, and was obliged to spend a considerable part of his time in drilling and marching. As it happened, however, this hard necessity turned out a benefit. Not only was the regular military exercise probably the means of establishing that robust vigor which characterized him during all the rest of his life, but his new associates, humble as they were, found means to give him practical proofs of their regard. One of his comrades was an Auvergnat, who had a little business in charcoal and firewood. In their long hours of guard-duty the two became intimate, and the Auvergnat entrusted the young architect with his first commission, a little building for his business. In 1835, Bailly, who had not been forgotten by his former school companions and teachers, received a small appointment as *sous-inspecteur* in the service of the city, and was afterwards advanced to the rank of *inspecteur.* In this capacity he was engaged on the Hôtel-de-Ville, and, later, under Visconti, on the Molière fountain. He was soon taken permanently into the city service, and was promoted with what seems, to a Frenchman, tolerable rapidity. In 1854, when he was forty-four years old, he was made section-architect, and, six years later, architect-in-chief, and designed for the city various octroi-houses, the Mairie of the Fourth Arrondissement, the new portions of the Lycée St. Louis, and, finally, the Tribunal of Commerce, his greatest work.

IT is hardly necessary to say that the emoluments of a subaltern in the architectural service of the City of Paris are not adapted for the comfortable support of eleven young people, and the kind elder brother had to look about for additions to his income. The experience which his active life brought him, as well as his cool, sensible judgment, earned for him an appointment as expert to the courts, which helped out his income, besides increasing his reputation; and his archæological acquirements becoming known, he was made diocesan architect to small provincial bishoprics, and in that capacity restored portions of the cathedrals of Digne, Valence and Limoges, besides remodelling the well-known house of Jacques Cœur, at Bourges, for a court-house, and restoring the palace of the archbishop. During all this time, he continued his connection with the National Guard, which suited his energetic physique, and, as before, he received unexpected help from his military service. Another comrade in guard-duty turned out to be a manufacturer of marble tombstones, who was glad to employ his new friend to design some of his more important monuments. This brought Bailly into relations with some well-to-do people, and, among others, with a connection of the banker Frémy. This last introduced him to Frémy himself, and, through this introduction, the young architect was employed to enlarge and remodel the building of the Crédit-Foncier, of which Frémy was president. By these new acquaintances he was introduced to Isaac Péreire, who gave him an important commission, and introduced him in his turn to Baron Haussmann. These introductions gave him a footing among the financiers, and a similar sequence of events launched him among the rich aristocracy. Being a handsome man, and a good soldier, he was, in course of time, selected as captain of his company, and made the acquaintance of the major and colonel of his regiment. The major was a great manufacturer, and soon found an important piece of work for his new friend, while the colonel, who belonged to the highest nobility, introduced him to a most aristocratic circle. For the members of this distinguished society he did a good deal of building, including the restoration of the castles of Theuville and Cany, the enlargement of that of Orme-du-Pont, and new work for the Prince of Montmorency-Luxembourg, the Marquis de Ganay and M. Schneider, the President of the Chamber of Deputies. Notwithstanding his anxiety to obtain employment, and the aristocratic character of his clients, Bailly preserved his artistic conscientiousness to a remarkable degree. The Count Pourtalès, who had taken a fancy to him, asked him to make designs for the addition of a third story to the mansion which Duban had built for him in the Rue Tronchet. The building was a beautiful one, artistically complete as it stood, and Bailly absolutely refused to have anything to do with making a change in it. He even made an enemy of the Emperor in much the same way. Just before the Italian War, the Emperor was in Brescia. It happened that some of the local archæologists were at work, excavating in front of the town-hall, and, by a coincidence which the archæologists could perhaps explain, just as the august visitor approached, a beautiful antique bronze statue of Victory was dug out of the excavation. The Emperor was pleased to see in this occurrence an augury of his approaching triumph over the Austrians, and on his return to Paris, with the statue, finding that Bailly was about to undertake the designing of the Tribunal of Commerce, he requested that the new building might recall the little town-hall of Brescia, in front of which the happy omen of his good fortune had been revealed. He could not remember anything about the building, except that it was arcaded underneath, and had handsome pilasters above, and, he thought, a large dome on top. Bailly sent for drawings and photographs, which were duly laid before the Emperor. They showed, indeed, a charming little town-hall, with arcades and pilasters, but nothing even remotely resembling a dome. The Emperor, however, could not get the idea of the dome out of his mind, and directed that the new building should be made to resemble the Brescia town-hall as closely as possible, considering the difference in dimensions, but that a dome should be put on top. Bailly was not the man to put a dome over nothing. He arranged his plan with a dome, to be sure, but he made the dome the crown of a beautiful staircase-tower, which was quite unlike anything in the Brescia building, and interfered so with the Emperor's reminiscences that he never forgave the architect. Other people, who cared more for art than reminiscences, took a different view of the matter, and Bailly, soon after the completion of his work, was elected a member of the Institute, President of the Academy, a member of the Superior Council of the School of Fine-Arts, President of the Société Centrale des Architectes, and President of the Society of French Artists.

A CORRESPONDENT of *Fire and Water* gives an amusing account of the Roman fire-brigade. It is not often that a fire occurs in the Eternal City, but one destroyed the Palazzo Negroni a few weeks ago, and such buildings will occasionally burn down. So far as the fire-brigade is concerned, the conflagration meets with little opposition in its course. Although there is a corps of officers, these, it seems, are by no means always present at fires, and would not be of much use if they were, half of them, at least, having no experience in such matters. As for the worthy chief-commander of the brigade, it appears that he resides in a villa, outside the gates, some miles from the centre of the town, and has no telephone or other quick communication with the fire-stations, so that he could hardly be expected to reach the scene of a conflagration in time to be of much use. Under these circumstances, it is, naturally, undesirable to wake him up in the night, or otherwise disturb him, to notify him of fires, and we are told that he usually learns of them, if at all, by accident. The officers being thus more or less unavailable, the privates of the corps discharge their duties as suits themselves. Personally, the firemen are said to be bold and energetic, but their efforts are not aided by the ample provision of modern machinery that we are accustomed to in America. There is, to be sure, a steam fire-engine, but it is of so ponderous a design that it cannot be dragged up any of the hilly streets which are so common in Rome, and even in the circumscribed territory in which it can be manœuvred at all, it generally arrives too late to be of any service. The other machines belonging to the brigade are hand-engines. One of these has its usefulness somewhat restricted by being kept in a house with a narrow door. In order to get the engine out, in case of an alarm, it is necessary to tip it up on edge, like a piano, haul it through the door, and right it again outside, before the horses or boys can be harnessed to it, and the fire is generally out before this operation is accomplished.

IN external appearance, however, the Italian firemen compare favorably with any in the world. In Rome, they are provided not only with polished brass helmets, but with sabres, which certainly have an elegant effect, and, if not extremely useful for extinguishing fire, or convenient in climbing ladders, are, of course, valuable for cutting down brigands, if any should be met with on the way to the conflagration. In Turin, the firemen are supplied with carbines, no doubt with a similar object. The system of ascertaining the location of fires when an alarm is given, corresponds with the other details of the service. Not long ago, according to the correspondent, fire broke out, from a gas-explosion, in the Associated Press Office, opposite a fire-brigade station. The alarm was given, and the fire-brigade turned out with such energy that the men rushed with their engine directly by the place where the fire was, and never stopped until they reached the outskirts of the city.

MUSEUMS.[1] – I.

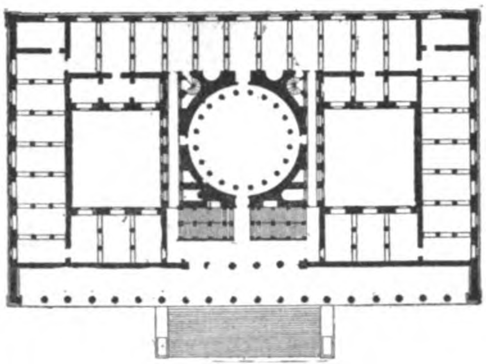


Fig. 1. Plan of the Museum of Berlin.

IN antiquity, the word museum was used to designate a place dedicated to the muses. At the present day, the term is applied to the monumental structures built for permanent collections of works of art, natural history specimens, and scientific or industrial models. The idea of gathering together and grouping types of works, or remarkable objects, for the amusement, or instruction of the public hardly antedates the middle of the last century. Up to that time, pictures and statuary were all included in royal or private galleries, to which the masses had no access.

When steps were first taken to form public collections of such works, they were placed in edifices already built, and which were more or less favorably arranged for exposing them. But it soon became evident that in order to exhibit paintings to advantage, they must be shown in a special light, that is, they required a distribution of the light which was incompatible with the ordinary methods of admitting it into buildings. Hence it would be necessary to reconstruct wholly the rooms sculpture is on the ground-floor, the paintings in the first story. For pictures, side lighting is absolutely proscribed: the light must come from above, through a glass roof. The Louvre contains a most complete collection of the art of all countries. Here Babylon and Memphis, ancient Persia and Phœnicia

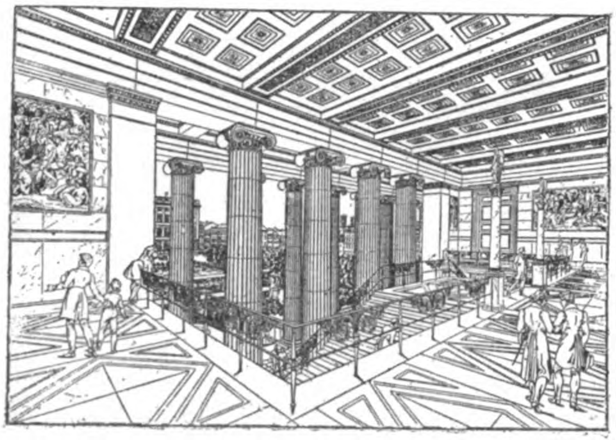


Fig. 2. Berlin Museum (Vestibule of the first story).

jostle against Rome and Athens. The terra-cottas of Etruria and the frescoes of Pompeii are seen side by side with the graceful specimens from Tanagra; the jewels of Roman ladies, the sword of Charlemagne and the crown diamonds adorn the glass cases in the Gallery of Apollo and the adjoining rooms. Near the pottery of Bernard Palissy, eighteenth-century minia-

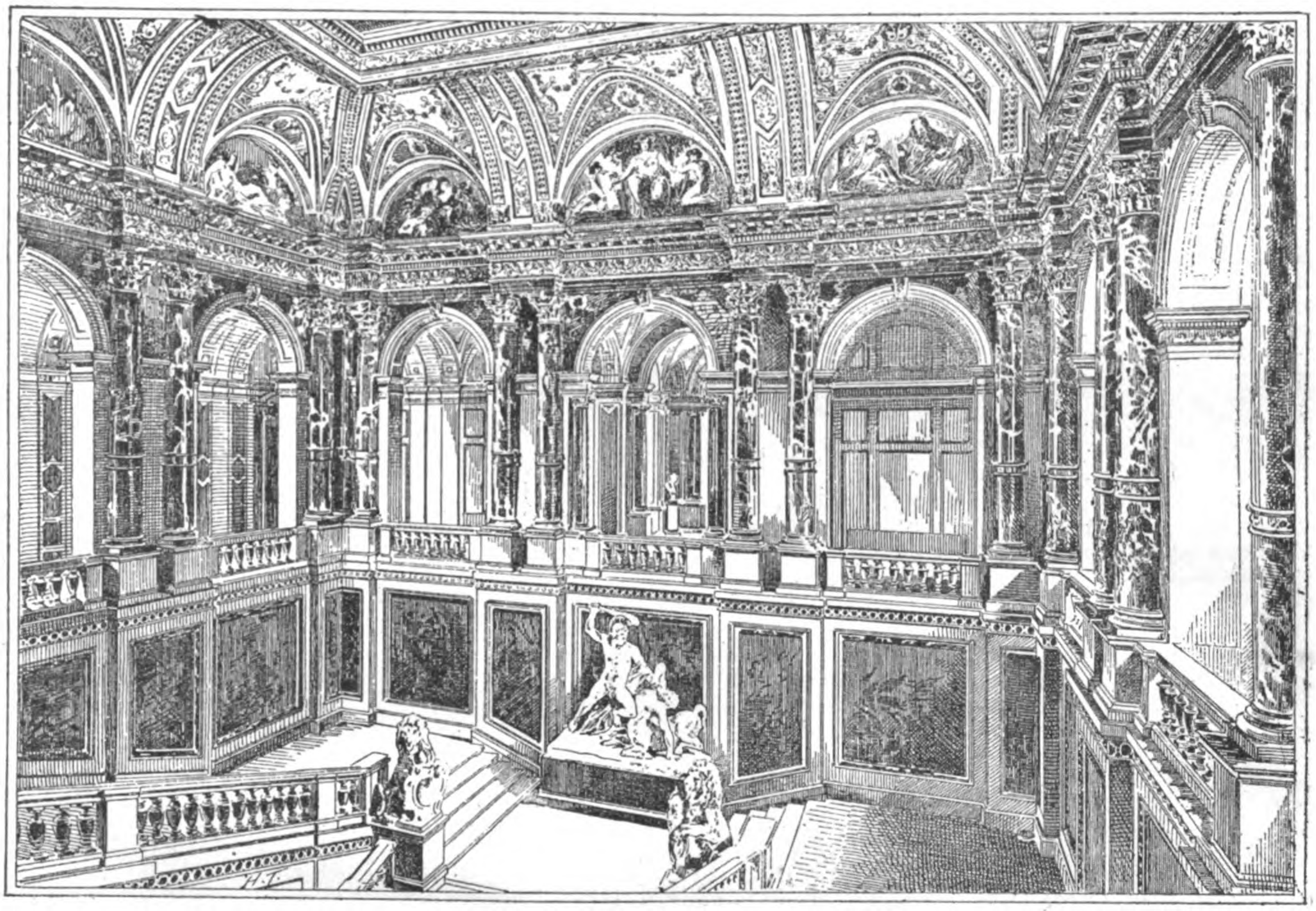


Fig. 3. Staircase of the Vienna Museum.

of existing buildings in order to adapt them to their new purposes. Something better was done in most cases: special edifices were erected to receive the collections, and it is only of these that we shall present plans or views.

The two most complete and most beautiful museums in the world are the Louvre at Paris and the British Museum at London. In Paris, the most varied collections of art have been placed in the palace of the kings of France. The

tures may be found and the *bibelots* of the Sauvageot collection. Architecture is also represented; and even Chinese knick-knacks have a place in the vast edifice. Plans and views of the Louvre have been given in detail in an article on the palace itself.

The British Museum stands next to the Paris Museum in the variety and importance of its collections. It includes, in addition to its art galleries, an immense library. The plan is rectangular and very symmetrical [See *American Architect* for October 17, 1891, "Libraries," Figure 5].

[1] From the French of E. Rümler, in Planat's *Encyclopédie de l'Architecture et de la Construction.*

The Italians, who possess the noblest masterpieces, have not succeeded in exposing them advantageously. Almost always, as in the Pitti Palace at Florence, the light is admitted through lateral bays; this favors, it is true, one or two canvases, but the light does not reach most of the works, and makes it impossible to see others on account of the glitter and reflection.

One of the oldest structures built expressly for the exhibition of works of art is the Museum of Berlin. It was begun in 1825, by Schinkel, on a rectangular plan of 92 metres by

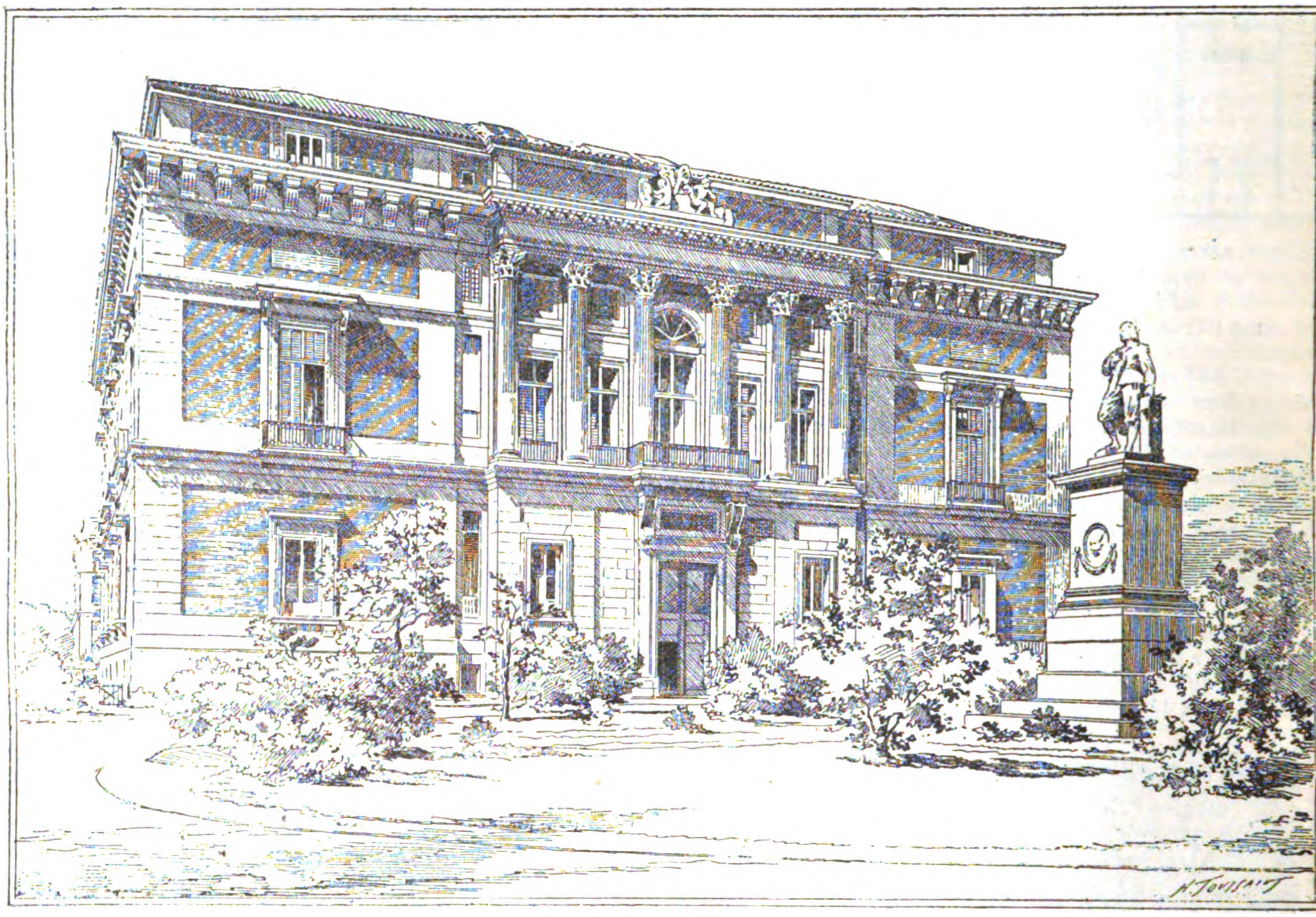


Fig. 4. Museum of Madrid.

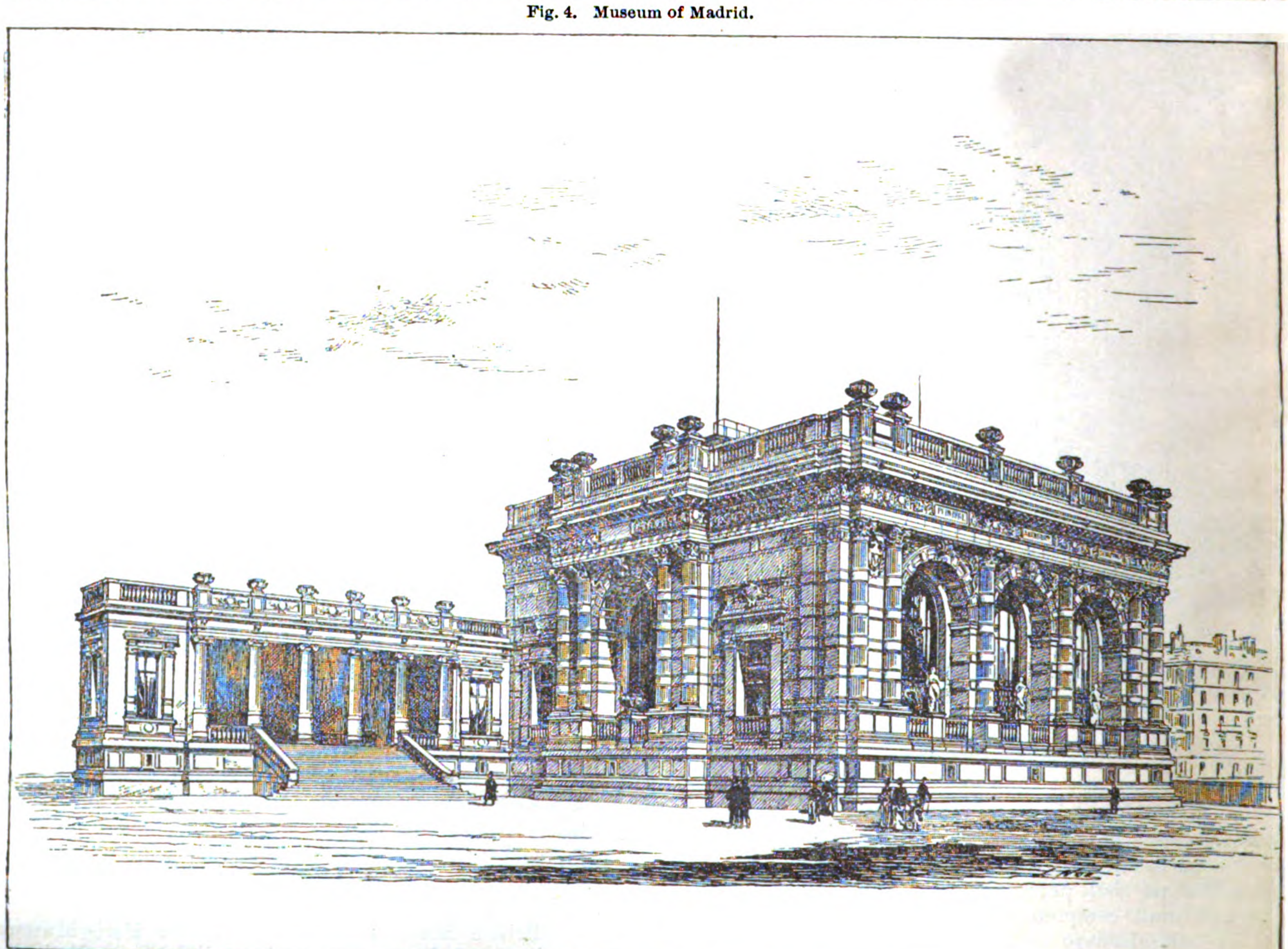


Fig. 6. Musée de Galliéra, Paris.

57 metres. It encloses two nearly square courts. In the high basement are the administration services, the store-rooms, etc. The ground-floor is devoted to sculpture, the first story to painting (Fig. 1). On the main façade, the two upper stories are spanned by a grand colonnade of eighteen Ionic columns. In the interior, a spacious staircase gives access to a large vestibule, open on one side, toward the square and the public garden (Fig. 2). A circular apartment, recalling the Pantheon of Rome, forms the centre of the edifice.

Among the museums of capital cities we call attention to those of Vienna (Fig. 3) and of Madrid (Fig. 4). At Vienna the buildings are grouped on an immense square, wholly surrounded by monumental constructions and conceived with due decorative effects, like the Paris Place de la Concorde. The Art Museum and the Museum of Natural History face each other [See "Austrian Architecture," *American Architect* for February 7, 1891, Figure 30]. Each forms a rectangle 95 metres by 49 metres. On the ground-floor of the Art Museum are the quarters of the directors and attendants; in the entresol is the sculpture gallery; in the first story, the picture gallery; and on the floor above, the collection of engravings. The architecture of the two museums is identical. A general view will be found under "Austrian Architecture" (Fig. 13) in the *American Architect* for January 24, 1891, and the details of the central pavilion may be studied under "Modern Architecture" Figure 32, *American Architect* for August 6, 1892.

Passing to less important art museums, we find a good representative of these in the new Museum of the Luxembourg.

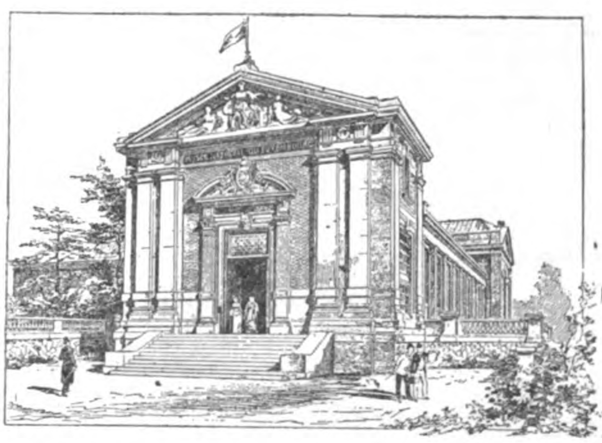


Fig. 5. The Luxembourg Museum, Paris.

It comprises two rectangles at right angles to each other. We enter first the administration pavilion (Fig. 5). On the ground-floor are the apartments of the chief guard and the cloak-room, as well as public water-closets and urinals. In the first story is the office of the curator. Just back of this pavilion is the gallery of sculpture, a vast rectangle lighted from above, with the statues disposed in four rows. It contains 430 square metres.

In addition to this, there is an extensive terrace outside, surrounded by stone balustrades, which is designed for the reception in the open air of certain sculptures for which the site is better suited. The area of the terrace is 280 square metres.

The part of the museum reserved for painting comprises a large hall opening into the sculpture gallery and at the angle of the two main buildings; then follow four large rooms and six small ones, the whole making up the subdivisions of the great rectangle. Owing to this subdividing of the interior space, there is a vertical surface of 2,200 square metres, which provides for nearly seven hundred canvases, allowing 3 or 4 square metres to a picture. The light is admitted from above through ground-glass.

It is probable that the City of Paris will at some future day possess a sort of branch of the Luxembourg in the Musée de Galliéra. This museum, not yet finished, is the munificent gift of the Duchesse de Galliéra. It comprises a grand central pavilion, with two small wings adjoining, forming porticos (Fig. 6).

[To be continued.]

MODERN ASYLUMS FOR THE INSANE.[1] — VII.

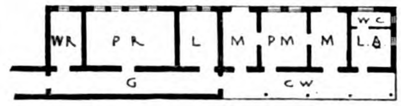


Fig. I.

C. Corridor.
C W. Covered Way.
L. Laboratory.
L A. Lavatory.
M. Mortuary.
P R. Pathological Room.
P M. Post-mortem Room.
W R. Waiting-room.
W C. Water-closet.

THE mortuaries for an asylum should be placed in a detached position, and as much out of view of the patients and attendants as practicable, but yet not too far from the main buildings, for it is desirable that the post-mortem room should be in conjunction with these, and the convenience of the medical men and pathologist must, therefore, be kept in view.

The arrangement which is shown in Figure 1 is one which has been found in England the most convenient and economical: the diagram shows the post-mortem room, *P M*, placed between the two mortuaries, *M M*, with doors connecting the rooms, one mortuary being reserved for females and one for males.

The post-mortem room should be provided with a fireplace and a water-supply laid on to the room. Lavatory accommodation, *L A*, should be also provided with water-closets, etc., attached. A waiting-room, *W R*, is necessary for jurymen or such others as may have to attend inquests, when it is required to hold these on the asylum premises.

In many new asylums it has become the custom to provide a pathological museum, *P R*, as shown in Figure 1, and indeed of such great importance do medical men value the provision of a special apartment for the purposes of pathological investigation, that it is frequently added to old asylums, and no asylum of the future is likely to be considered complete without a pathological museum.

We have already quoted the opinion of authorities on the medical staff attached to an asylum, and thereby drawn the attention of our readers to the fact that assistant medical officers are in many asylums too few in number for the work which is absolutely necessary, and for the careful scientific investigation which is now expected in County asylums the medical assistance is often wholly inadequate. A pathologist of great experience, not of necessity a resident medical officer of the asylum, should be attached to all first-class institutions of this kind, and it has indeed been suggested that he would be more useful if not withdrawn from his fellow-scientists outside, and to facilitate the inquiries of this officer, he should be provided with a laboratory fully equipped.

Prevalent causes of death in the patients' wards have been: exhaustion after mania and melancholia; general brain disease and epilepsy; diseases of the lungs, heart disease, etc.; and deaths are accelerated by fractures of the limbs and sundry accidents, difficult to avoid considering the condition of the patients.

We find that in the Colney Hatch Asylum there were 2,250 patients resident on the 31st of December, 1891, and that during that year there were no less than two hundred and twenty-six deaths (134 males and 92 females), more than four deaths weekly, being at the rate of 10.04 per cent on the average number resident. During that year we understand that post-mortem examinations were made in no less than 198 instances, but inquests were only held in the cases of three men and three women: of the men, one died suddenly while seated in the ward, from rupture of the heart; the second case was that of an elderly man suffering from general paralysis who was pushed off his seat by another patient, two ribs being fractured in the fall; the third man died from syncope and a weak heart; the three women were old and feeble and died from the results of accidents which befell them — for these reasons inquests were held. Owing to the extreme vigilance of the nurses, no cases of suicide occurred that year. We give these few particulars to indicate the utility of the mortuaries and as a general suggestion of what is required. It will be perceived at once that the death-rate of most asylums being high, the mortuary accommodation must be sufficient not for the average deaths per week, but for the highest probable number that may die in any one week. Although the number of females resident in the above-mentioned asylum was greatly in excess of the males, yet the number of deaths in 1891 was less among that sex.

For the architect to design and plan any portion of an asylum building no larger or smaller than it should be is often a somewhat difficult problem. There are so many points to consider and, even in so simple a matter as a mortuary may appear to be, it is difficult to provide a building to meet the requirements of every contingency.

We have already referred to the detached fever-hospital requisite in all large asylums and now give a plan of an arrangement for six females and six males (see Fig. 2). Other offices than those indicated would be required for laundry and disinfecting purposes, etc.: these, of course, must be independent of the general asylum laundry and offices, and everything must, as far as practicable, be isolated. Great care must be exercised in placing the disinfecting-apparatus in a suitable position, having regard to those engaged upon the disinfecting operations and their connection with the hospital and the outside public.

The necessity for a simple and economical arrangement by means

[1] By George H. Bibby, F. R. I. B. A., F. R. Hist. S., and Ernest A. E. Woodrow, A. R. I. B. A. Continued from No. 933, page 72.

of which bedding, carpets, linen, clothing, etc., may be effectually disinfected, is one that presses frequently on local authorities and other public bodies; the problem to be solved is how the disinfection of articles of various kinds can be completely effected at the cost of a not unreasonable preliminary outlay, and at a moderate expense

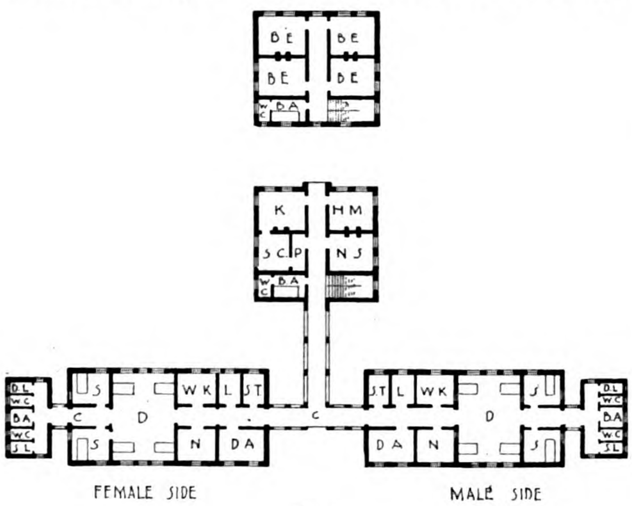


Fig. 2.

B E.	Attendants' Bedrooms.	N.	Nurses' Rooms.
B A.	Bath-rooms.	N S.	Nurses' Sitting-room.
C.	Corridors.	P.	Pantry.
D.	Dormitory.	S.	Single Rooms.
D L.	Soiled Linen.	S C.	Scullery.
D A.	Patients' Day-room.	S L.	Slops.
H M.	Hospital-Matron's Room.	S T.	Store.
K.	Kitchen.	W K.	Ward Kitchen.
L.	Lavatory.	W C.	Water-closets.

when the disinfecting-chamber has been constructed and is in working order. A good disinfecting-chamber should be provided with separate rooms for receiving and delivering the articles to be dealt with so as to avoid all risk of reinfection.

The heat for disinfection should be generated by means of a multiple stove or stage furnace, the fuel — say cinders — being placed on each of the shelves and gradually worked down till the whole is completely consumed. The air, which is previously highly heated by passing through a number of flues surrounding the furnace, should be admitted at the bottom of the stove and pass over the various stages of shelves of burning fuel and by the time the air has arrived at the top shelf it will have gathered an intense heat, which should, however, be subject to regulation in temperature by the admission of cold air, for which due provision should be made.

From the furnace the super-heated air should then be made to pass, by a series of flues round the chamber to be heated, rising rapidly to any required temperature, under control and regulation. When fresh fuel is required it should be placed on the top shelf of the furnace, but before putting on the new fuel, the top stage should be raked onto the second, the second onto the third, and so on until the bottom stage or shelf is reached. The advantage of this form of stove will be readily seen, as it is capable of using all classes of waste carboniferous vegetable substance or refuse and cinders, which are frequently thrown away and yet form a good fuel for this purpose, thus making the cost of the heating practically *nil*.

Economy is also materially assisted by the infected clothing, furniture, etc., being thoroughly cleansed and purified ready for use without any risk, thus avoiding the necessity of destruction and saving the cost of replacement.

An arrangement should be made for the insertion of a coil in the furnace by which steam should be generated in the boiler, and injected at will, as circumstances may demand, into the chamber. Some goods require this special and exclusive treatment, for instance pillows, mattresses, made-up goods and upholstered work, which are very difficult to deal with and need a penetrative force, which is only to be found in the highly saturated heat of steam. The risk of damaging articles operated on by this process is very slight, and thus a decided advantage is gained over the old system of dry heat, which until quite lately was generally adopted in England for this purpose, but it is, of course, most essential that the heat in the chamber should be under complete control, so that the articles may not be damaged by an excessive temperature. In order to obtain this desired control a damper of air louvres should be provided to open automatically, so that whenever the required temperature for thorough disinfection is exceeded, a stream of cold air may be admitted into the chamber, preventing the temperature from rising above the safe limit. At the same time the vitiated air should be forced through a tube into the furnace, being there purified and passed away into the chimney. The damper must be arranged to close automatically as soon as the cold-air supply is sufficient to prevent the temperature from increasing. This arrangement, as has been found, can be easily and readily adjusted to operate at any required temperature, thereby rendering any close attention on the part of the attendant unnecessary.

The articles required to be disinfected are taken first into the receiving-room and then transferred to the chamber, where they can be left with perfect safety until the process of purification is completed. Provision should be made for passing the vitiated air in the chamber through a furnace so that, when the attendant proceeds to remove the goods it contains pure air and is at a low temperature. The chambers should be fitted-up with wrought-iron fittings on which mattresses, pillows and other goods could be placed during the process of disinfecting. It is found that the cost of such a chamber as we have described, nine feet by six feet, including expenses of erection, fittings and materials, would be a little over one hundred pounds ($500).

The general rules for water-supply and drainage apply to asylums, but there are many special points to consider, having regard to the isolated position in which an asylum is frequently erected and the large number of the resident population. The provision for every inmate must not be less than fifteen gallons of water per day, and for each horse sixteen gallons, four of which are consumed with the food. For a rainfall source, tankage must be provided capable of holding a three-days' supply — in England the average rainfall from roofs is estimated at eighteen inches per annum.

Two feet per second is the least velocity which will keep sewers clear of all ordinary obstructions, but the smaller pipes require a velocity of three feet per second to keep them clear.

It is quite inadmissable that either main sewers or drains should be laid beneath any inhabited portion of any asylum; these must always be external and should be adapted to special requirements of each building, but exclude the surface water; the roof water should be stored in tanks for use. Surface channels and special drain-pipes should be provided for subsoil water as well as excesses of roof and other surface waters so as to reduce the volumes of fluids to be dealt with by land irrigation.

Automatic flushing-tanks should be placed at the head of sewers and drains to receive waste-water from baths and lavatories, etc., to be used for drain flushing; the main sewers should be laid out in straight lines with true gradients from point to point, with man-holes at each principal change of line and gradient. Small chambers should also be formed at intermediate changes of line, having movable covers to allow for inspection, which should be easily removable. Earthenware pipes with asphalt sockets make good sewers and drains up to their capacity, which for the large asylums may be twelve inches in diameter but never need be more; these must be truly laid and securely jointed with Portland cement so as to be quite watertight, and in all cases should be tested with water before being covered in. Pipes of unequal sectional diameters should not join with level inverts, but the lesser or tributary drain should have a fall into the main at least equal to the difference in the sectional diameters.

Earthenware pipes of equal diameter should not as a rule, be laid as branch and tributary drains, that is a nine inch should not lead into a nine inch drain or a six inch into a six inch, but a lesser should be joined to a greater diameter. The drain should not pass directly from the sewers to the inside of basement walls, but should end on the outside of the walls, and should be ventilated or have a siphon trap beneath an inspection-shaft covered by a grating. Sewers or drains should not be ventilated by flues constructed in the body of the walls of the inhabited buildings, as such flues would become foul and could not be cleansed.

The soil-pipes from the water-closets should be of cast-iron, not less than four inches in diameter, fixed externally to the wall and carried up above the roof, full bore, for ventilation. To fully test the joints the bottom of the soil-pipe should be plugged and the pipes filled with water and left for a day or two. The surface inlets to all pipe-drains should be properly protected so as to prevent large substances being passed in and choking the drains; the inlet should be less in diameter than the drain-pipe below. Side junctions should be effectually made good and their positions marked upon the drain plan which should be always kept upon the premises.

Tall chimneys, such as steam-boiler chimneys, may be used with advantage for sewer ventilation. The English Commissioners in Lunacy have laid great stress upon the necessity for carrying out all works of sewage in the best possible manner and have issued many practical suggestions in reference to the whole subject, in which they have been aided by Sir Robert Rawlinson, C. B., the Government Engineer, who has also given valuable suggestions in reference to water-supply and irrigation in connection with asylums.

In building sewers and drains, danger may be anticipated from several conditions, as when the trenches are deep and the substrata consists of made ground, loose earth, bog, silt, quicksand or any combination of such strata. Quicksand is most difficult to deal with, and as a rule such ground should only be opened in short lengths; the ground may require to be close-timbered, and in such cases stable litter and ashes will be found useful to pack behind and between the "polling boards." On quicksand, pipes of cast-iron, with watertight joints, should alone be used. Ground working clay or marl will also require careful timbering to prevent heavy breakings from the sides of the trenches, as when such ground "sets" heavily the earthenware pipes may be destroyed by cracking, crushing, or by distorting the line of sewer or drain.

Trenches should in all cases be carefully timbered, and such timbering in bad ground must either be left in or be removed with great caution as the trenches are filled-in with concrete. Sewers and drains should be capable of conveying sewage to some common

outlet, without retaining sediment, they should have arrangement for ventilation at all the highest points, and at intermediate intervals of not more than a hundred feet apart.

Defective work in main sewering and draining, producing leaking joints or fractured pipes are, of course, most injurious, and will be both difficult and costly to repair; the greatest care should, therefore, be taken in the first instance to make good sound work and to fully test the sewers and drains before the trenches are filled-in.

Sewer and drain pipes of earthenware may be rendered inefficient by the joint stopping and so allowing the sewage to leak into the subsoil; it is almost impossible to prevent earthenware pipes having leaking joints in loose ground; the safest and soundest sewers and drains may, therefore, be made with pipes of cast-iron, properly black-varnished, with the socket joints turned and bored or made with lead, as for water-supply. The largest main sewer for an asylum, if of iron, need not exceed nine inches in diameter, as it may be effectually flushed under pressure.

Few asylums are erected without trouble and anxiety respecting the water-supply and the whole subject is frequently surrounded with difficulties — the following points are worthy of attention:

The reservoir for the pure-water service must be carefully covered-in, and at the same time fully ventilated. Filters of any kind to purify water must be clean, and must be kept so, or they will become pollutors; there is no exception to this rule, and filters, large or small for public use or for domestic purposes, must be cleansed effectually at frequent intervals. Cast-iron pipes properly varnished should alone be used for water-mains, and it is not advisable to use any pipes for the mains less in internal diameter than four inches; lead should not be used for drinking-water cisterns, but slate, boiler-plate, or, for large elevated tanks, cast-iron. Wrought-iron service-pipes are cheaper, stronger and more easily fitted than lead pipes. When, however, wrought-iron pipes are used in the ground externally, as from the main building, the pipes should rest in a casing of wood and be protected by asphalt.

Earthernware pipes, with asphalt joints supplemented by Portland cement, may be used for water conduits to bring the water from springs or reservoirs situated at a distance, provided the joints are not placed under pressure, that is to say, there must be an even graduated fall with the open lower-end delivery.

Shallow wells are liable to pollution from infiltration of solutions of vegetable and animal matter, unless, indeed, the brick lining is rendered absolutely watertight, down to the water-bearing strata, by rendering in cement, or better still, by having a lining of cast-iron cylinders to exclude the surrounding subsoil water.

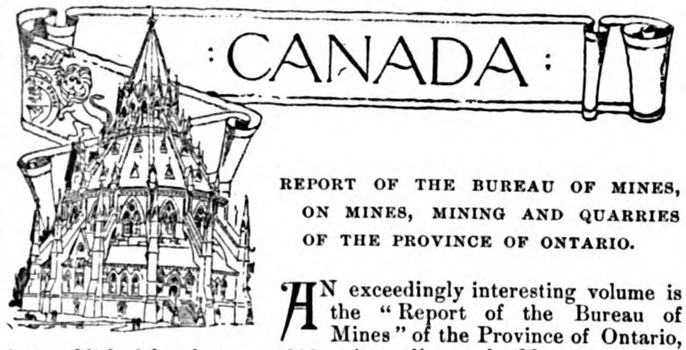
Natural springs may be utilized by storing the water in a covered and ventilated brick or cement concrete reservoir, a capacity of contents of not less than the flow of one entire day. Springs of water at a distance may be conducted in pipes laid so as to span the intervening distance. The fall of a conduit may vary according to circumstances, but should not be less than one in a thousand, nor greater than one in three hundred, unless cast-iron pipes are used.

In forming an earthenware-pipe conduit, great care must be taken, first to make the trench watertight, and then to lay asphalt jointed pipes embedded in cement, so as to secure a sound and watertight conduit throughout its entire length. In forming an aqueduct the pipes should be laid in well defined lines, and there should be means of ventilating and inspecting in each quarter of a mile: there should also be means of washing out at convenient points. A valley line should be crossed by means of a cast-iron siphon, which should have sufficient head, and there should be a sluice valve provided at the lowest point to wash out and cleanse out the siphon. Tanks for storing water should either be of stone, brick or cement concrete and be roofed or arched over so as to allow protection from the direct action of the sun and from any possibility of fouling. Ample means of ventilation should also be provided.

A more important illustration of the care that should be taken in determining the source of a water-supply, could not be cited than that which is, at the time we write this paper, engaging the attention of the English Press. On the south coast of England a terrible outbreak of typhoid fever has attacked one of our favorite seaside summer health resorts in the height of the season. The hospitals, as well as other buildings that have been brought into requisition as temporary hospitals, are full, a special staff of nurses have been imported into the town and the doctors of the town have placed their time at the service of the sanitary authority. A general panic has taken possession of the inhabitants of the town and the usual summer visitors naturally keep aloof. The source of the epidemic is believed to have been definitely traced to the impure water-supply. The supply is a well, or spring, which is fed by a water-course travelling under some fields, which have been hitherto used by the municipal authorities as a sewage-farm, and it is presumed that a percolation of the sewage through the soil has infected the water. We read that the source of the water-supply has now been condemned, and that the town is supplied by water-carts and tanks from the water company of a neighboring locality. With all the knowledge of the need of sanitary precautions, this case in a seaside health-resort, above all places, strikes one with alarm at the neglect shown of the primary principles of hygiene.

The question of sewage irrigation as applied to asylum estates is of great importance and in our next paper we propose to consider some points in connection therewith.

[To be continued.]



REPORT OF THE BUREAU OF MINES, ON MINES, MINING AND QUARRIES OF THE PROVINCE OF ONTARIO.

AN exceedingly interesting volume is the "Report of the Bureau of Mines" of the Province of Ontario, just published for the year 1892. According to the Mines Act, 1892, the owner or agent of every mine to which the Act applies is required to send to the Bureau of Mines on or before December 1st of each year, the statistics of his mine for the year ending on the preceding 31st day of October.

The information required to be so furnished is very full, and includes the numbers of persons employed over and under seventeen years of age, the average wages earned, together with the quantity in statute weight of the mineral, dressed and undressed, which has been sold, treated or used during the year and the value or estimated value of it. Failure on the part of owners or agents to furnish these particulars, or false representation by them of these particulars renders them liable to penalty. The Act being new the reports furnished for this first year of its operation are not altogether satisfactory, but doubtless they will improve when the requirements of the Act are better understood, and the value of statistics better appreciated by mining men.

The best known mineral regions of the Province are the districts of Algoma and Nipissing. Algoma being situated at the western extremity of the Province north of Lake Huron and east of Lake Superior, and Nipissing about the centre of the north of the Province to the east of Lake Huron or rather the Georgian Bay, an arm of the Lake from which Nipissing is separated by the Parry Sound district. Algoma has an area of 43,132 square miles and Nipissing 3,722 square miles. The most valuable minerals are found within their limits including gold, silver, nickel and copper. Until recently it was supposed that gold only existed in workable quantities in the County of Hastings, Ontario, and in the Lake-of-the-Woods District in Manitoba. But within the last two years promising leads have been discovered in the valley of the Thessalon and Vermilion Rivers in Algoma and in the vicinity of Lake Wahuapital in Nipissing and a number of "locations" have been taken up in these regions. Important discoveries of silver, copper and antimony ores are also reported in other regions. During the year 1892 the areas for which mining patents were issued under the Act equalled 6,200 acres and the amounts paid, therefore, $15,373.00.

The Report states that "about one hundred quarries were worked during the year for building-stone material, chiefly limestone and sandstone." Returns from all the quarries could not be obtained but a careful estimate has been compiled which gives the following statistics of quantity and value of the different classes of material:

Dimension stone........	2,600,000 cu. ft.....	$680,000
Heads and sills..........	50,000 " ".....	26,000
Coursing stone..........	64,000 sq. yds....	42,000
Rubble, etc.............	730,000 cu. "	132,000

Making a total value of $880,000. The amount of wages paid to workmen was $730,000.

Much the greater portion of the cement made in Ontario is the product of natural rock, but although the quantity was 7,977 barrels more than in the preceding year, the value was $839 less. Portland cement began to be made in 1891, when the output was 2,033 barrels valued at $5,082. The quantity and value of both classes produced last year was:

Natural rock.................	54,155 bbls.....	$38,580
Portland.....................	20,247 "	47,417

Making a total of $85,997 for 74,402 barrels. The amount of wages paid being $53,151.

The returns received of the quantity of lime burned last year are not complete; an estimate placed it at 2,600,000 bushels valued at $350,000, with wages amounting to $120,000.

The following table gives the quantity and value of material, other than as above, for building purposes:

Drain tile..................	10,000,000....	$100,000
Common brick..............	175,000,000....	980,000
Pressed-brick, plain.........	20,342,000....	198,350
Pressed-brick, fancy.........	1,323,000....	32,253
Roofing-tile.................	383,000....	8,613
Terra-cotta..................	....	20,119

The pressed-brick works have added largely to the output of 1891, the increase in the number of pieces being 8,431,000 valued at $102,636. Pressed-brick companies paid in wages during the year, $88,865, and for the making of common brick and drain tile, wages were paid to the amount of $445,000.

The quantity of nickel and copper ore raised was 72,349 tons and the quantity smelted 61,924 tons. Some of the companies engaged in mining these ores have erected Bessemerizing plants in connection with their works, employed to enrich the matte, but only a portion of the matte is treated in this way. The quantity of ordinary matte produced at all the furnaces was 6,278 tons and of Bessemerized matte 1,880 tons. The following table gives the estimated metal contents of these mattes and their values at the works:

Nickel	2,082 tons	$590,902
Copper	1,936 "	232,136
Cobalt	8¼ "	3,713

The total value, therefore, was $826,750, the nickel being calculated at $284 per ton or 14.2 cents per pound — the copper at $120 per ton or 6 cents per pound and the cobalt at $437 per ton or 21.84 cents per pound. It should be noted that these values are computed on the selling-price of mattes at the works and not on the price of the metals after they have been refined in Great Britain, the United States and elsewhere. London quotations for nickel ruled steadily at 42 cents per pound and New York quotations at 48 to 50 cents per pound during the latter half of the year, the higher price in the United States being maintained by the protection of the customs duty.

At the mines there was employed underground an average of 197 men and above ground of 243 men over seventeen years of age, while of boys under seventeen there was employed an average of only 10, all above ground. The average of men employed at roasting and smelting was 240, the average of all classes of workers being 690. The aggregate time of labor in the mines was 105,890 days and at roasting and smelting 52,420 days, making a grand total working time of 158,318 days for the 690 employés. The amount of wages paid was $339,821, the average wage per day would, therefore, be $2.14⅝. These are the calculations of the four mining companies in operation. Gold mining has been comparatively active during the year, but the work carried on has been mostly of development character. Mine companies have made returns of work done during the year ending 31st of October, which show that 3,710 tons of gold ore was mined, the value of which is estimated at $36,900. The wages paid amounted to $22,750. Mills for treating the ore were being erected when this Report was drawn up, several of which are now in operation. New processes of treating ore are being adopted and interesting results may be expected when the next report is drawn up.

Nearly all the silver mines in the Lake Superior district were idle during the year, and the work done on five or six locations was chiefly the opening and proving of veins.

No iron mining is reported for the year but several properties were prospected with a view of improving the quantity and value of their ores.

Summarizing the mineral production, the Report remarks that the total value exceeds the value of last year by $668,466, but the principal increase is in nickel and copper in which there is a different basis of values for the two years.

In a chapter on "Iron-making in Ontario" the Report says that "the Province of Ontario is singular in being almost alone among the great commonwealths of our continent without a blast-furnace for the production of metallic iron." Iron-making has been undertaken at different times and in various places, in the Province, but in almost every instance by men without skill or experience and with only very limited means.

The first blast-furnace in Ontario was built about the year 1800 at the falls of the Gananoque River, an old-fashioned stack and with it was a forge for the manufacture of bar-iron. But the location was too far from the ore deposits and the ore was of inferior quality and after two years this venture was abandoned.

The next furnace was started twenty years later at Charlotteville, Norfolk County, to smelt the bog-iron ore in that district and was carried on successfully for a quarter of a century, or until the supply of ore in the locality became exhausted.

It 1820, steps were taken for making iron at Marmora, Hastings County, a furnace was erected for the purpose of smelting hard magnetic ores, but this ill-fated furnace ruined or crippled three or four successive owners in the course of forty years, although the greater part of the time it was out of blast. In 1837, Commissioners reported on a scheme to acquire by the Government, the "Marmora Ironworks," for the purpose of utilizing convict labor in the production and manufacture of iron. The Report was very favorable to the scheme and the commissioners seemed to think they had struck a bonanza for the Government, particularly as the owners had a contract with the Government for the delivery of pig-iron ballast into the naval yard at Kingston at a full remunerative price of £13,000 sterling. They estimated the value of the works to be at that time £23,770 sterling, with a total yearly revenue of £9,145,178. One member of the Commission, however, presented a minority report, and his views together with the representations of the Warden of the Kingston Penitentiary, of the difficulty of maintaining discipline over the convicts if so employed, of the extra cost of additional guards, of the inability for physical reasons of so many of the convicts to perform the work, and so on, appear to have convinced the Government that the project could not be carried out. Operations at the mine came to an end in 1883, when the whole property that had accumulated including railways and rolling stock, mines, furnaces and works were sold by order of the Court, on account of the misuse of the then proprietors of the grants obtained from the Government. It was bought at the nominal price of $32,000, but though the purchaser is still the owner, the "Big Ore Bed" at Blairton is filled with water and furnaces and works are tumbling into ruins. Several of the blast-furnaces were built and started in various places but all came to grief, one from one cause, another from another. In one case, the failure resulted from the necessity of making costly experiments with an ore the nature of which was not fully understood; another from "want of funds"; others found the cost of transport of material too heavy or that local fields became exhausted sooner than expected, but from whatever cause every attempt has been abandoned. The Report of the Bureau of Mines proceeds to show the advantages that exist for producing iron and the advisability of the work being undertaken by competent men not afraid to put a considerable amount of capital into the work for the purpose of starting it fairly.

The Report then reviews at large the qualities of the ores to be found in the Province and forms an estimate of the quantity which it gives in round numbers as "1,000,000,000 tons, a quantity sufficient to yield 1,000 tons of iron a day for 3,000 years."

AN ARCHITECT'S LIBRARY.[1]

BOOKS on architecture may be grouped — first, comprehensive books; secondly, special books; thirdly, hand-books. Before we begin to name and consider a few of the most useful examples of each class, there are some general matters to be noticed. First, as regards architects' books, note that they are of little value unless they are illustrated — nay, some of the best consist of illustrations only, and have no letter-press. It is through our eyes that we take in our knowledge of architecture and of architectural construction also. This is best done by seeing buildings, and next best by seeing them or parts of them represented; accordingly, an architect's books are mostly picture-books. Curiously enough, the Continental publishers — Italian, German, French, and even Spaniards — much more readily incur the expense of elaborate illustrations of a large size than do English ones. Almost all our English illustrated books are octavos with cuts in the text and but few plates, while the publication of a folio, or even a quarto, with such sumptuous engravings as the Continental books habitually include, is quite an exceptional thing here. Now and then, of course, we do a big book, and, on the other hand, both French and German publishers now and then bring out a small one with cuts; but still the broad difference remains. The great changes that have been introduced into the methods of illustrating, both by photography and by the new process for reproducing photographs and also drawings, will make the illustrated books of the future differ from those of the past. Photographs of buildings will often take the place of drawings, though they are no doubt less useful. Fortunately the means of reproducing drawings will afford such facilities as will stimulate the publication of them also. To return to letter-press, however. In studying any great subject you will usually find out that there exists one book out of which most of the others dealing with the theme are made — that is to say, that one man of good powers will have gone into the subject thoroughly — construed it completely, and written what he knows — and in doing so will have produced the standard work. Many others will subsequently interest themselves in the subject, and will in many cases carry it farther; but what they write will in the main be the contents of the standard work over again, with some additions and illustrations. And, as a general rule, any subject about which no standard book exists is systematically left alone by ordinary book-makers. Obviously it is of great importance to know which these standard books are, and study them thoroughly. As examples, Pasley on brickwork and Tredgold on carpentry may be named; but perhaps the best instance of a standard book on an architectural subject is Rickman's "*Analysis of Gothic Architecture.*" Before him no one had lucid orderly ideas upon the subject, though attention had been long directed to it. He personally studied the Gothic buildings of all periods of England. He established a simple classification on so reasonable and sound a basis that no one has sensibly added to our stock of knowledge — or (with the exception of Sharpe) has seriously proposed a modification of Rickman's periods; while Continental students of architecture have arranged the sequence of their examples on the same lines, if under false names; and many other subsequent books have only rewritten Rickman or condensed him, or expanded him.

Again, with regard to every book, it is of great advantage to know what are the characteristics — *i. e.*, the merits, the defects and the peculiarities of the author, or at any rate of his work. One writer is brilliant, but not always accurate, another is original, but not lucid nor is his work always well arranged, and so on. It is of especial importance to know how far you can trust an author, and what sort of information you can hope to get from his writings and what not. It is useful to go to more than one sort of book, for if an accurate painstaking writer be the most trustworthy when you are seeking for information, he may be so dry that you are glad as a change to take up some author of more genius, if perhaps with less knowledge. It is not easy to give much useful advice upon "how to

[1] By Prof. T. Roger Smith, F. R. I. B. A. An opening address delivered on Tuesday, October 10, 1893, at University College, Gower Street, W. C.

read." Most readers are helped by the habit of making notes as they go along. If well done, this practice leads to something valuable if it results in something like a condensed record of the contents of a book; but that circumstance is of small importance compared with the question, Does it or does it not aid you to concentrate your attention on what you read, and help to fix it securely in the memory? If you find it does, practice it. If otherwise, only use it occasionally. I have, however, no hesitation in recommending the practice. As you read, if you take notes, illustrate them with free sketches from the pictures in the book, and when you are not taking written notes it is still desirable to do the same thing. I do not suggest laborious copies of cuts in a book (still less tracings), but pencil sketches, freely done, of those portions of the illustrations which bear most closely on the subject under consideration. For beginners in the reading of an art, as well as for beginners in the art of reading, it is of great importance that the books first taken up should be attractive ones, and on this account some part of the history of architecture is a better starting-point than any portion of the study of materials or construction. It is in the greater possibility of their being made interesting that lies the secret of the superiority of a course of lectures over a course of reading. The lectures may not be able to convey much information that could not be got at by a sufficient amount of severe study in a library; but if a man knows anything of how to lecture he will manage to make the same information ten times more telling than it will be felt to be by a student depending solely on books. It is much more useful to possess a few good books, and to use them thoroughly well at home, than it is to have access to a large library, and to glance in a superficial way at a great many.

I hope that all my hearers will accumulate, or are accumulating, a little store of books, and will take some pride in having good ones and in good condition. It is not throwing money away, if you have a little to spare, when you now and then get a favorite volume bound, or at least half-bound, and in London it is very desirable to keep your books from dust. The most complete way of doing this is to have a glass-fronted book-case. A more modest substitute, but a useful one, is to nail a strip of leather or cloth to the front edge of each shelf wide enough to protect the tops of the contents of the shelf below. Though one's own books are one's best friends, even a well-stocked series of volumes will not suffice, and recourse must be had to a library, and nowhere are a little guidance and a little previous knowledge of writers and of the subjects they treat more useful than when one first attempts to make use of the accumulated store of a large library. For this purpose you require to get a knowledge of names of writers to enable you to consult the catalogue with success. In some libraries no attempt at all is made to classify the subjects of books in the catalogue, and the names of the authors given in alphabetical order are the only clues to the books, and everywhere they are of importance. And so almost the first preliminary for any one who wants to use a large library is to know who has written about what. That information is not easy to get at, and it is one of the advantages of the excellent "*Dictionary*" of the Publication Society that it bristles with references to books. The same thing is true to a considerable extent of the laborious and learned, but unequal, compilations of Perrot and Chipiez. In most libraries the librarians will be able to give some information as to the books dealing with any special subject, but it is not always safe to count upon that help, and, as the student must find out a good deal for himself, he should treasure up references to books as he happens upon them. A series of three lists, each of one hundred books, has been pointed out to me by Mr. Batsford, to which I beg to draw your attention. They appear in the *American Architect* for July 30, 1887, and two of them were the two best of a considerable number sent-in in competition for a prize. The third list is one drawn up, not in competition, by Mr. Batsford himself, and shows a much better knowledge of books than the two others. Between them they will furnish the titles and authors' names of a very excellent series of books on our art. As regards working in libraries, it is worth while to make use of the most accessible, if possible. Among the many public libraries now established, there are some which contain many of the books we want to consult, and most of them contain some. The best and best organized collection of books both on architecture and on construction, beyond doubt, is that of the Institute of Architects — it is readily accessible without payment to all architectural students.

Next to it is the extremely extensive Art Library at South Kensington. Admission there is obtainable at a very moderate fee, and almost every published book on fine art (including architecture) can be consulted there; but, of course, books on construction are absent, and the catalogue is not in as perfect a condition as it will be when the revision now in hand is complete. The library of the Architectural Association has been hitherto exclusively a lending library, and it is only recently that it has come to have a reading-room for members at all. It has now a good collection of valuable books, and it has an excellent system by which country members may borrow books as well as London ones. A library formed many years ago exists at Sir John Soane's Museum in Lincoln's Inn-fields. It is now under the care of Mr. Wyatt Papworth. It includes, with books of general literature, a good many books on architecture. Any student desiring to make use of it should apply personally to the librarian. The London Institution and the London Library in St. James's Square, nay, even Smith's and Mudie's, each lending libraries, all include a proportion of architectural books. To students of the Royal Academy there is a splendid collection of books on fine art open in the library of that rich institution, and last and greatest, there is the enormous British Museum Library. This vast collection is readily accessible to any reader known as a genuine student. In the reading-room there are about 20,000 very carefully-selected books of reference, and these one consults easily enough. Any book not in the reading-room, and of which you know the title correctly, can be brought to you, but the delays are unavoidably great, and as a rule, it would be better for any student wishing to consult books about architectural subjects to go to the Institute library or to the one at South Kensington. There is a good and increasing library of technical books, chiefly relating to construction, but embracing some on architecture as a fine art, at Carpenters' Hall, in the City of London. It is accessible on very easy terms, and books can be borrowed under suitable conditions, and there is also a reading-room, but it is as a lending library that it is likely to be of most service to any students of this college. It is now time to turn to the question of buying a library — a student's one, that is. To form a small collection of useful books is one of the objects which an intending architect should early propose to himself. It may hereafter grow into a library, or it may never expand very greatly; but whatever it may lead to, the shape of the collection at first will usually be a modest number of books, chiefly manuals, many of them bought second-hand, usually a few at a time, and often out of but slender resources, with here and there a more expensive volume obtained as a prize or a present, or out of some windfall. Let us imagine a collection of this sort, started by a student, and with access to a good reference-library for such books as he cannot afford to buy, or does not need to possess, but only to consult. If the course begins with Egyptian architecture, he may buy as a manual "*The Monuments of Upper Egypt*," by Mariette; and he will find for reference an excellent account of Egyptian art in the "*History of Art in the Ancient Egypt*," by Perrot and Chipiez, the first, and by far the best volumes of a work on ancient art published in French, but accessible in an English translation. For Greek architecture it is not easy to name a manual, but small condensed editions of Stuart and Revett's "*Athens*" will be the best. There is a somewhat full chapter on Greek in the "*Manual of Architecture: Classic and Early Christian*," prepared by Mr. Slater and myself. For reference the central and best book is the "*Athenian Architecture*" of Mr. Penrose, and there is the folio edition of Stuart and Revett's book. For those who read German there is an excellent book by Bötticher. There is also one by Fergusson. For Archaic Greek architecture the books of Dr. Schliemann must be consulted. Something of Roman architecture and of Greek also will be found in "*Leeds on the Orders*," one of the series of elementary green-books known as "Weale's Series." Apsodious's account has been published about Roman art. Perhaps the best recent book to refer you to is Middleton's "*Ancient Rome in* 1885," and the most fully illustrated works of reference are by the Italian antiquary, Cassina, who also has fully illustrated Etrusca. For Assyrian and Persian art I can name no good English manual, though I believe there is a good French one. The books of reference include further volumes of Perrot and Chipiez, and the splendidly-illustrated works of M. Place and of Sir H. A. Layard. On Mohammedan architecture there exists an admirable manual by Stanley Lane Poole. It is one of a series published by the Department of Science and Art, and is entitled the "*Art of the Saracens in Egypt*." It is the best book of the series to which it belongs, and is extremely good. Of books of reference they issue the "*Alhambra*," by Owen Jones, "*Arabian Architecture*," by Coste and "*Arabian Art*," by Prisse d'Avennes, all three superbly-illustrated books. It is difficult to recommend an English manual dealing with Renaissance and modern work. But the student perhaps by this time may have succeeded in adding Fergusson to his shelves, who devotes a whole volume of the history to Renaissance. He will also find a good account of Renaissance work in Rosengarten's "*Architectural Styles*," a smaller work of the same sort as Fergusson's. Lastly, among small books, some very little volumes long since out of print must be mentioned. These are the hand-books to the "art courts" of the Crystal Palace by Digby Wyatt, Owen Jones, Waring and others. Occasionally, an odd copy turns up at a second-hand shop, and it should be secured as a prize if one can be found, and the little volumes are well worth consulting in reference-libraries when studying the subjects of which they treat. Suppose the student to be working at construction and materials, the first manuals to collect would probably be Dobson's "*Rudiments of the Art of Building*" (Weale's Series), "*Anderson on Materials*," Tarn's "*Science of Building*," his edition of "*Tredgold's Carpentry*" and his volume on "*Roofs*." Mitchell's handy volume, with its many clear engravings, is an elementary manual from which a good deal is to be learned; and with Seddon's "*Builder's Work*," or some similar book, the student would find that he had made, at any rate, a good beginning of a library on building. In French there is an excellent manual on building construction by Ramée — "*L'Architecture et la Construction Pratique*." All these are more or less comprehensive books. The various articles in the dictionaries, especially the Publication Society's one, and that of Viollet-le-Duc, give treatises more or less complete on the separate subjects which go to make up a complete knowledge of materials and construction.

There are not a few special books on these subjects which should be added one by one to the collection, if the dictionaries cannot. For example, on individual materials, "*Laslett on Timber*" is an excellent book.

There is also an admirable French book on the same subject by Dupont and La Grye, called "*Les Bois.*" On stone there is a good book by Hull, "*Ornamental and Building-stones.*" On concrete there is a useful volume by Potter, and there is one on foundations and concrete works by Dobson in Weale's Series, and so on for each branch of knowledge. These books are for the most part well known. You will find some of them enumerated in the *American Architect* lists already alluded to — and others in the series of lists — increasing in extent one after another, published in the *Calendar* of the Institute as a guide to students preparing for the examinations held there. You will be able to consult in the libraries the books themselves, and by degrees to buy them, one after another, as you get the means or feel the use of them. Supposing a student to have begun to collect books, and to have arranged for his admission to a reference-library, it may be worth while to consider a little more closely when he has these methods at his disposal how he can make the best use of them; and we must suppose that he does his evening work partly at home and partly at a library, and that his own collection begins with manuals and not much more, is gradually enriched by the addition to his shelves of a certain number of special books, and ultimately of some comprehensive one, probably beginning with "*Gwilt's Dictionary.*" We will thus assume that all the architectural books he wants are open to him, but that some, mainly those on his shelves, are the easiest to reach. It is not, as a rule, the case that the manuals give the best information, unless they are restricted to a narrow section of a subject. Manuals of a limited scope may contain enough information to be thoroughly useful; but if they cover a great extent of ground every word has to be measured out by the writer and to be weighed by the reader, and there is no room for the necessary explanations and no allowance for one's inevitable forgetfulness. The best service that such books can render is to refresh the memory and remind the reader of what he has learned in books that are more full; and where a book can be found dealing at some length with the topic which you want to study, it is more useful than either a manual on the one hand or a chapter out of a dictionary of the art on the other hand. Unfortunately, there is not always a good, clear, full book to be met with treating the subject adequately every time the student desires, so to speak, to take a fresh step, and he must therefore welcome them when he finds them, and when he cannot make the best use of either the very little books or the very large ones.

And here we may inquire briefly what are the names and what is the scope of those comprehensive books of reference to which allusion has been more than once made. Of general books the foremost undoubtedly is "*Gwilt's Dictionary,*" an extremely complete book of reference and a very mine of useful knowledge. The original, by the late Joseph Gwilt, has been greatly increased, both in bulk and in completeness, by additions by Mr. Wyatt Papworth, who has revised the whole and brought it up to a modern date. On the whole, the portions relating to materials and construction are the best, though a great deal of valuable matter relating to Classic architecture, and some relating to other phases of the art, is included. It is not to be supposed that you will set to work to read "*Gwilt's Dictionary*" through — you might almost as well read the "*London Directory,*" or at any rate "*Johnson's Dictionary,*" — but there are many parts of it which it will be very advantageous to read in default of special treatises, and the book is one that, as it contains something about everything architectural, ought to be one of the earliest purchases of a student. You can often get a second-hand "*Gwilt,*" but do not buy a very early edition or you will miss Mr. Papworth's many and most valuable additions and corrections. Another book of universal scope and of the greatest excellence is the "*Dictionary of Architecture,*" produced by the Architectural Publication Society. This is a costly book in several volumes, of small folio size, with plates and cuts. It is alphabetically arranged like an encyclopædia, and the articles in the earlier volumes were contributed by many different architects and others. The latest ones are almost entirely from the pen of Mr. Papworth. Few subjects on which you will require information are absent from these pages. The articles are full of useful matter: they form condensed, detached, short treatises, they are extremely trustworthy, and, what is of very great importance, they almost invariably give references to the books where fuller accounts of each subject is to be got. This book can, of course, be consulted in all architectural libraries, and there is a copy in the library of this college and many architects have it. Not a little of the information you require can be found in any good general encyclopædia. The reissue of the "*Encyclopædia Britannica*" has many first-rate articles on detached subjects, and it has an excellent article on architecture, of which half is by my predecessor in this chair, Professor Hayter Lewis, and half by the late Mr. G. E. Street.

Lastly, let me recommend the back volumes of the professional journals and the *Transactions* of the Royal Institute of British Architects containing papers on, and illustrations of, almost every subject that you can think of. In the course of years all sorts of architectural topics come up in the public press and before the professional societies, and if you hunt through the indexes of these publications when you are seeking for information which eludes you in books, you will often be rewarded. Of general books which have a more limited range the most important is Fergusson's "*History of Architecture.*" This is a book in four large octavo volumes, profusely illustrated with wood-cuts. Two of these volumes treat of the history of the art in the Western world down to the Renaissance. A third treats of Modern Architecture, and the remaining one of Oriental. It may be worth while to point out that this work is an enlargement of an earlier book by the same author, "*The Hand-book of Architecture*" — a very valuable work, almost, to my mind, more useful for a student to possess than these larger books, and one that I advise you to buy if you meet with it. Mr. Fergusson gives references to the sources from which his illustrations are obtained, and occasionally to his authorities, and you are, generally speaking, quite safe in accepting any statement of fact that he makes as trustworthy; but his opinions — which, by the bye, he often puts forth as if they were facts, may or may not be correct. He was a man of wide and deep knowledge, but not of equally well-balanced judgment, and now and then he jumped to conclusions which a mature judgment ought to have induced him to reconsider; but to reconsider an opinion was not in his nature.

For those who read French, there is the wonderful dictionary of Viollet-le-Duc, and which, within the limits that the author has set himself, is almost exhaustive both as to construction and as to art. On the constructional side, the most comprehensive book is that by Percy Smith, known as the "*South Kensington Notes on Building Construction.*" These are in four large volumes, of which all are useful; but the third volume (on materials) and fourth on difficult construction, including iron structures, are more valuable than the earlier ones, which are elementary and a little diffuse. A condensation of these into one handy volume has been made by the author, and will be enough for most students' purposes. Very little has been passed over by the learned and indefatigable engineer officer, who has given many years of labor to this work and any volume of it will be a valuable possession if you can acquire it. "*Builder's Work,*" by Seddon, is a condensed treatise, with the same sort of scope, but less minute. A condensed book on construction is about to appear, which aims at compressing into one volume, to be sold at a reasonable price, a very wide extent of information indeed. I allude to Allen's "*Practical Building Construction,*" a handsome volume with nearly one thousand cuts. The illustrations are clear and sensible, and though the book covers too much ground to enable the writer to be very full anywhere, it appears to convey the most important facts about each material and the mode of using it. This opinion is given as the result of a necessarily hasty inspection of a work which seems likely to prove very serviceable. Comprehensive books were, the lecturer added, best as works to turn to when a student wanted to know something. The way to learn a subject was to begin with a restricted portion and to master that, and then go on to the next portion, and so to learn it in detail. Thus, for example, if a student wishes to take up Gothic architecture and had access to nothing better than the general writers, he might take Fergusson first. In the "*History*" he would find the comprehensive general course that was run by Gothic architecture illustrated by plans to small scale and views of important buildings, but no minutiæ. To make real progress in the knowledge of Gothic architecture, so far as it could be got from books, the student would have to turn to something more specialized, and Rickman's "*Analysis,*" which the lecturer had already named, was the book to which the student of Gothic architecture should first have recourse, and which he should make his guide, philosopher and friend. Rickman's "*Analysis*" was a book to possess and to study, and as the additions to later editions were not of the same value as the original, one should buy an early edition of the work if one was found reasonable. The various characteristics which Rickman gave could be fixed in the mind by careful reading and re-reading, and by making sketches, first from the illustrations in the book, and then from actual work.

The second-best special book was Sharpe's "*Parallels,*" a huge folio book of illustrations, and a splendid volume. In it a certain number of Gothic abbey churches, chiefly those of Yorkshire, were anatomized, compared and contrasted in the most thorough and interesting manner. When the student got to Tudor architecture Sharpe's volume would, however, fail him, and he would then do well to look for examples of work in two finely-executed books of plates by Pugin in his "*Examples*" and his "*Specimens*" of Gothic Architecture. The lecturer would next recommend the careful study of the volume of lectures by Sir Gilbert Scott, which contained the results of an intimate knowledge of Gothic art acquired through a lifetime of study and practice, and were profusely and beautifully illustrated. It was usually easier, when one had mastered the rudiments of a study, to pursue it with reference to some good examples, than to go on with comprehensive views only, and a monograph on some good Gothic building would be helpful at this stage. Two such works were Scott's "*Westminster Abbey*" and Willis's "*Canterbury Cathedral.*" Paley's book on "*Mouldings*" would supply in considerable detail, examples of one important feature in Gothic buildings, and would probably stimulate the reader to take profiles for himself. Two books by a prolific, but not always accurate, writer on Gothic architecture — the late John Henry Parker — ought not to be omitted, viz, his "*Glossary*" and his "*Domestic Architecture.*" If now the student extended his pursuit of the knowledge of Gothic architecture across the Channel, there were two remarkable books,

each unrivalled in its way, which ought to be studied — the "*Dictionnaire de l'Architecture*" of Viollet-le-Duc, and the "*Abécédaire*" of Du Caumont — the first-named work was a perfect mine of knowledge, and was profusely illustrated by charming cuts. Of books describing French Gothic buildings, there was a profusion. The monograph on "*Chartres Cathedral*," published by the French Government, was the finest known to the lecturer; but in the works of English writers, such as Johnson, Norman Shaw and Nesfield, as well as in the works of such Frenchmen as Chapuy or Du Caumont, there was an infinite wealth of illustration of details and ornament. Suggestive works calculated to give food for thought were Ruskin's "*Seven Lamps*" and his "*Stones of Venice*," Garbett's "*Design*," and, in a different strain, some of the publications of Pettit, Freeman and Sharpe; Street's "*Brick and Marble Architecture of Italy*," and his "*Gothic Architecture in Spain*," carried the mature student farther afield, and were models of what an architect's travelling-notes should be; but they were hardly easy reading. There were several useful manuals on the subject. The elementary volume on "*Gothic and Renaissance Architecture*," which Mr. Poynter and the lecturer prepared was, he hoped, serviceable as far as it went; and then in Weale's Series was Talbot Bury's "*Styles*," and another sound manual was Bloxam's "*Principles of Gothic*." In conclusion, Prof. Roger Smith described some of the luxuries of an architect's or a reference library — magnificent volumes, full of large and brilliant plates, which it was a treat to examine. Students who had access to a fine library were not always awake to the idea of how easy it was to give themselves much pleasure by simply going through one of these great works as a relaxation after a spell of the more moderate and practical ones. Time thus spent was by no means wasted. It was for such a purpose that these sumptuous volumes were collected at great cost, and he would say to all students, Do not scruple to make use of them. Numerous examples of these valuable folios were exhibited, a few belonging to the library of University College, others from the Professor's own library, and others lent for the evening by Mr. B. T. Batsford, of High Holborn, the architectural publisher, and the lecturer referred to several of these in detail, suggesting their special features and value in a brief running commentary. Mr. Roger Smith added: "I have endeavored to direct your attention to books on architecture as a valuable possession, as a source of information and interest, and as a means of real gratification. I have also pointed out a few of the books to which you can turn with the certainty of its being worth your while. Like many other fruitful subjects, that of books on our art is not capable of being completely dealt with, much less of being exhausted within the limits of an hour's lecture, and if you take up architectural books as one of your pursuits, you will find them both profitable and pleasant. You cannot, even if you care nothing for books, get on altogether without them; but what I desire is to persuade you to form the habit of looking upon your books as among your best friends and your constant companions, the library as your pleasant resort, and reading as an art to be cultivated carefully and practised daily."

SOCIETIES

ENGINEERS' CLUB OF PHILADELPHIA.

AT the business meeting, held November 4, 1893, President John Birkinbine in the chair, twenty-six members and visitors were present.

Mr. John C. Trautwine, Jr., with the aid of the blackboard, described the largest one of the four single-track stone bridges which are being thrown across the wild and narrow valley of the River Pruth in Galicia. This is a segmental arch, varying in thickness from seven to ten feet, and having a clear span of 213 feet, with a rise of about sixty feet. It was cheaper, on account of the good material at hand, to make these bridges of stone than to have them built of iron, and the one described above is believed to be the largest stone railroad bridge and the largest stone arch in existence, excepting the Cabin John Aqueduct Bridge, near Washington. In constructing the arch, the lowest or innermost ring, to avoid excessive loading of the centres, was built first and allowed to remain for two or three weeks before the upper layers were added. These were begun at not less than four points, the springing points and the middle of each haunch, simultaneously, and the closing of the ring took place simultaneously at not less than three points.

L. F. Rondinella, *Secretary.*

More about the Burns Statue for Providence. — The young sculptor W. Clark Noble has had another rebuff in his suit against the Burns Monument Association of Providence, R. I. The promoters of the monument to Burns encouraged him to begin and carry on far toward completion a statue of the poet, to cost $15,000, but when subscribers pleaded poverty the sculptor was asked to apply his statue elsewhere. The first trial granted $6,800 to Mr. Noble, but Judge Barker set the verdict aside. The second trial gave $7,300 to the sculptor; but Judge Morton has now set that aside. Perhaps if Mr. Noble has the firmness and the money to persevere he may end in obtaining from some sympathizing jury the full amount of his claim. — *New York Times.*

ILLUSTRATIONS

[*Contributors of drawings are requested to send also plans and a full and adequate description of the buildings, including a statement of cost.*]

DELMONICO'S RESTAURANT, BEAVER AND WILLIAM STREETS, NEW YORK, N. Y. MR. JAMES BROWN LORD, ARCHITECT, NEW YORK, N. Y.

[Gelatine Print issued with the International and Imperial Editions only.]

THE SCHOOL-HOUSE, BAY RIDGE, LONG ISLAND, N. Y. MESSRS. PARFITT BROS., BROOKLYN, N. Y. AND MR. W. A. BATES, NEW YORK, N. Y., ASSOCIATED ARCHITECTS.

MANUFACTURING BUILDING FOR MR. ADOLPH SPIEHLER, ROCHESTER, N. Y. MESSRS. BLOCK & BARNES, ARCHITECTS, ROCHESTER, N. Y.

THE HESSIAN TOWN-HALL, WORLD'S COLUMBIAN EXHIBITION, CHICAGO, ILL. HERR KARL HOFFAKER, ARCHITECT.

INTERIOR OF THE MUSIC-HALL, WORLD'S FAIR, CHICAGO, ILL., PREPARED FOR THE FINAL BANQUET.

[Additional Illustrations in the International Edition.]

TRAVELLING SKETCHES IN SPAIN.

These sketches are copied from *Teknisk Tidskrift.*

IRON GRILLE AND MAIN STAIRCASE FROM A HOUSE IN THE AVENUE KLEBER, PARIS, FRANCE. M. RUET, ARCHITECT.

These illustrations are copied from *La Construction Moderne.*

THE OFFICIAL RESIDENCE, FREIBURG IN BREISGAU.

This plate is copied from the *Zeitschrift für Bauwesen.*

DANISH AND AUSTRIAN SPIRELETS.

These illustrations are copied from *Architektonische Rundschau.*

NEW CONVENT BUILDING, BANGALORE, INDIA.

The building, of which we copy an illustration from *Indian Engineering*, deserves a few words beyond an ordinary description. In the first place, it has been erected almost entirely by private means, the Government only having given a grant-in-aid of Rs. 4,000 towards it. While in Bangalore, we had the pleasure of going over it with the Lady Superior, and from her we learned the otherwise incredible fact, that she began it without a single *rupee* in hand; but, to use her own expression, "with a large account in the Bank of God's Providence." Many a time, during the course of its construction, the nuns were on the point of suspending the work, but money came when least expected, not all at once, but little by little, and now, after a period of three years, Bangalore may boast of having one of the finest schools in Southern India. The height of the central tower is about 100 feet. In niches on either side are statues in terra-cotta of St. Joseph and the Blessed Virgin, and these, as well as the group over the portico, representing our Lord blessing the little children, came direct from Milan. Ringing the bell, the door is opened by one of the industrial girls in a neat uniform; we enter a spacious hall 14′ x 54′, on each side of which are reception-rooms. There is a grand staircase of polished black wood leading to the second story, but we glance over the school-rooms, etc., downstairs first. Crossing the hall, we find ourselves in a splendid veranda 12′ x 184′. To the left and right are schoolrooms 23′ x 83′. These look very bright and attractive, the walls being hung with bright-colored maps and pictures from natural history and "object-lessons" just fresh from England. The wings on either side are used as refectories and class-rooms. We now retrace our steps and mount the stairs. Here, again, there is a long veranda. The dormitories, which have vaulted roofing, are really, without exception, the finest we have seen in India, and all the arrangements for the comfort of the pupils are excellent. We cannot praise the dormitories too highly. There is a third veranda from which one of the finest views in Bangalore may be seen. We questioned the Lady Superior as to *how* she got enough money for such an undertaking and her invariable answer was "God's Providence." No money has ever been received from any Missionary Association! It came, as it was required! One piece of princely generosity must be mentioned, however; the Maharajah of Mysore at first gave the timber at a very reduced rate, and finally on the birth of the last Prince, telegraphed to the Lady Superior the acquittal of the debt even of that amount. The Lady Superior herself superintended

the whole of the work, paid the men and kept the accounts, and she assures me the total cost is *under* Rs. 60,000. Sir Harry Prendergast, who visited the Institution while in Bangalore, rated it at a cost of 1½ lakhs.

COMPETITIVE DESIGN FOR NEW CATHEDRAL, VICTORIA, B. C.

THIS fine and picturesque design was originally made in competition for the new cathedral at Victoria, British Columbia, a competition which does not seem to have given much satisfaction to the competitors. The author was Mr. H. Wilson, on whom the mantle of his former principal, the late J. D. Sedding, has fallen in more senses than one, as any one will recognize who remembers the characteristics of Sedding's church designs.

The building was planned with a view to being carried out in sections according to the means at the disposal of the building-committee. The exterior would have been executed in local stone with a slate roof. The chapter-house and morning-chapel were to be done after the cathedral had been built.

The seating-accommodation was for a little over 1,200 persons, including the choir, and the estimated cost about 20,000*l.*, exclusive of chapter-house, cloisters and carving.

The drawing was exhibited at the Royal Academy of this year. This plate is copied from the *Builder*.

NEW ENTRANCE GATEWAY AND LODGE, WELBECK ABBEY, ENG. MR. JOHN BROOKE, A. R. I. B. A., ARCHITECT, MANCHESTER, ENG.

THIS gateway which is now approaching completion, will be the principal entrance to Welbeck, the seat of the Duke of Portland. The wrought-iron gates and railing are an important feature in the design. The heraldic treatment includes the arms of the houses of Bentinck and Cavendish, and the recent quartering of the Portland and Dallas-Yorke families. The main piers of the gateway, which are surmounted by "supporters," have a total height of 35 feet. The total width of the large gates is 16 feet clear. The whole of the walling is of magnesian limestone from the Anstone quarries.

This plate is copied from *Building News*.

REREDOS, GLASGOW CATHEDRAL, GLASGOW, SCOTLAND.

DURING the past few years considerable changes have been made in the choir of Glasgow Cathedral, with the view of bringing the arrangements and fittings more into harmony with their surroundings. These fittings being intended for the use of a Presbyterian congregation, are of a comparatively simple character. The old pulpit, which formerly stood in the centre of the choir, has been removed to the north side, and the enclosed space — or "bench," as it is called in the Scottish church — has been greatly enlarged, and now extends to the east end of the choir, where the high altar formerly stood. This space has been paved with marble, and is enclosed on either side by richly-carved oak benches. Till quite recently the east end was not enclosed, but the blank there has been filled-up by the reredos which forms the subject of our illustration. This has been erected by Lady Maxwell, of Calderwood, in memory of her late husband, Sir William Maxwell, tenth baronet, of Calderwood, in the County of Lanark. The reredos is of Caen stone and alabaster, and is the work of Mr James Young, sculptor, Glasgow. The figure on the south side represents St. Kentigern — otherwise St. Mungo — the patron saint; and that on the north side St. Ninian, who is believed to have been the first to introduce Christianity into the district. In front of the reredos stands a communion table of oak, elaborately carved and having a sculptured panel in front representing the Last Supper. The reredos and all the new work in the choir has been executed from the designs of Mr. John Honeyman, A. R. S. A., of the firm of Messrs. John Honeyman & Keppie, Glasgow.

GLENPARK, BALERNO, MIDLOTHIAN. MR. JAMES G. FAIRLEY, F. S. I. B. A., ARCHITECT, EDINBURGH, SCOTLAND.

OUR illustration shows additions recently made to Glenpark, the residence of Mr. James W. Thomson. It is situated near the Pentland Hills, and overlooks the Water of Leith, which runs through the estate.

THEIN CHURCH, PRAGUE, AFTER A DRAWING BY SAMUEL PROUT.

NOTES AND CLIPPINGS

ON THE LIFE OF IRON BRIDGES. — The following letter has lately been addressed to a member of the Glasgow Town Council by Sir William Arrol: "I am in receipt of yours of the 4th inst., and in reply have to say that if the convener is under the impression that the life of an iron bridge is only 40 years, he is under a mistake, as the life of an iron bridge depends entirely on how it is kept and the material with which it is painted for its preservation. I may say that in my experience I have examined a considerable number of iron bridges, and one I examined was up for 50 years, and the parts of it which were properly looked after were practically as good as on the day they left the works. Some three months ago I examined another bridge over a river; it had been up 30 years, and had not been painted for 15 years, but there was very little corrosion, the parts that were rusted were parts where drips of water had fallen and had not been properly attended to. Then, again, I examined another a few weeks ago which has been up 38 years, and every part of that bridge is practically as good as on the day it was put up. A few years ago I bought the material of the old Hammersmith Bridge, London, for the purpose of using it as a temporary plant in the erection of the Forth Bridge. It had been up for 62 years, and a great many of the parts had not been painted since its erection, as it was impossible to get at them; yet these parts were in a good state of preservation — in fact, quite as good as when they left the works. I took some of the material with which it had been painted to ascertain the reason for the good state of preservation it was in, and the result of the analysis was that the material with which it had been painted was genuine white lead. You can see from these examples that an iron bridge, properly taken care of by those responsible for it, will last practically for any length of time. The Bonar Bridge, which we have just replaced, was carried away by the strong floods; it had been up for 80 years. The iron part of the bridge, which was 150 feet span, was perfectly good, but the masonry piers got scoured out and washed away, therefore the ironwork fell into the bed of the river and was destroyed." — *American Engineer and R. R. Journal.*

THE INCOME OF THE WORLD'S FAIR. — The total paid attendance at the World's Fair from the opening day and including yesterday, when the Fair was formally closed was 21,458,910, divided as follows:

May	1,050,037
June	2,675,113
July	2,760,263
August	3,515,498
September	4,638,902
October	6,799,102

The total admissions on passes, including the employés of all kinds, exhibitors, concessionaires, etc., has been 5,953,818. Yesterday's admissions reached a total of 242,575, of which 208,173 were paid. The gate receipts will approximate $10,500,000, and the concession receipts $4,000,000. The fair has received about $2,500,000 from souvenir coins and premiums, and receipts from various sources, added to the $10,000,000 capital stock, make the total receipts approximately $28,400,000. The buildings, grounds, administration, and everything else under the direct jurisdiction of the exhibition officials cost about $25,000,000. The grounds will continue open as long as the managers deem best, but the dismantling will begin at once. — *N. Y. Evening Post. October* 31.

A BENZINE STREET FIRE. — A curious accident occurred at Budapesth, Hungary, September 14, according to the *Electrical World*, in which a street was practically set on fire, the flames reaching higher than the houses. A glass carboy filled with benzine accidentally fell from the cart in which it was being hauled and broke, the benzine running over the street and through the slot into the conduit of the electric railroad. An electric car passed just at that time, and it appears that there was some sparking between the trolley and the conductor in the conduit; this lighted the benzine, which burned with an almost explosive violence. The car was stopped and the frightened passengers dismounted through a sheet of flame, while the car was being set on fire. The flames of the burning benzine reached as high as the tops of the houses, producing volumes of dense smoke, until it was all consumed, about ten minutes after it was lighted. With the exception of a slight injury to the car, no further damage was done. — *Fire and Water.*

A TIDAL CLOCK AT ROUEN. — A clock tower which has been erected by the Chamber of Commerce of Rouen gives the time on three sides, and the height of the tide on the fourth which fronts the harbor. The tide-indicator consists essentially of a float, which, by means of a cord and counterweight hung on a drum, actuates a series of shafts with bevel wheel-gearing, and moves a hand or pointer on a dial like that of a clock, marked with the usual figures to show the level of the tide. The clock has an apparatus for distributing the time to other clocks in Rouen and also for unifying the time, after the method adopted in Paris. The dials are of opal glass and are illuminated at night-time. — *Invention.*

THE SITE OF THE NEXT PARIS EXHIBITION. — The Plenary Committee on Organization of the World's Fair, to be held at Paris in 1900 has confirmed the sub-committee's selection of the site. This site will include the Champ de Mars, the grounds of the Palais du Trocadéro, the Quai d'Orsay, the Esplanade des Invalides, the Quai de la Conference, the Cours la Reine and the Palais de l'Industrie. M. Terrier, Minister of Commerce, presided at the committee's meeting. — *Exchange.*

A REMOTE CAUSE OF EXPLOSION IN HOT-WATER APPARATUS. — As a possible source of danger that may have been overlooked hitherto, a writer in *Science* mentions the formation of explosive gas in the hot-water apparatus used in heating houses. Several quarts of gas each week were produced last winter in the radiators of two neighboring houses, the quantity being greater over a fire of anthracite than one of bituminous coal. The tests applied gave the impression that the gas was nearly pure hydrogen. It was evidently due to the decomposition of the water by the rusting of the pipes, which might be expected to take place most rapidly over an intensely hot fire of anthracite. — *Invention.*

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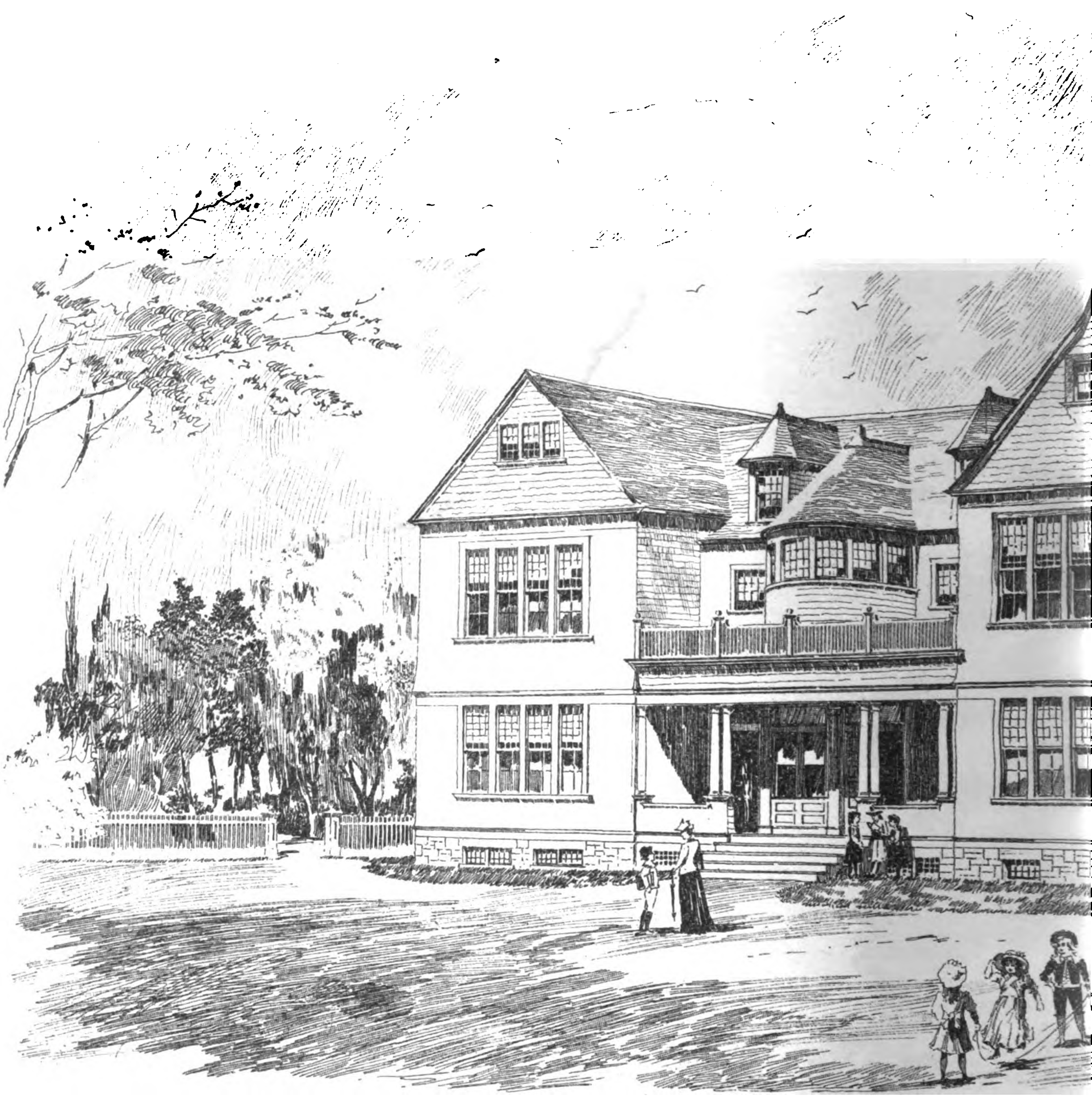
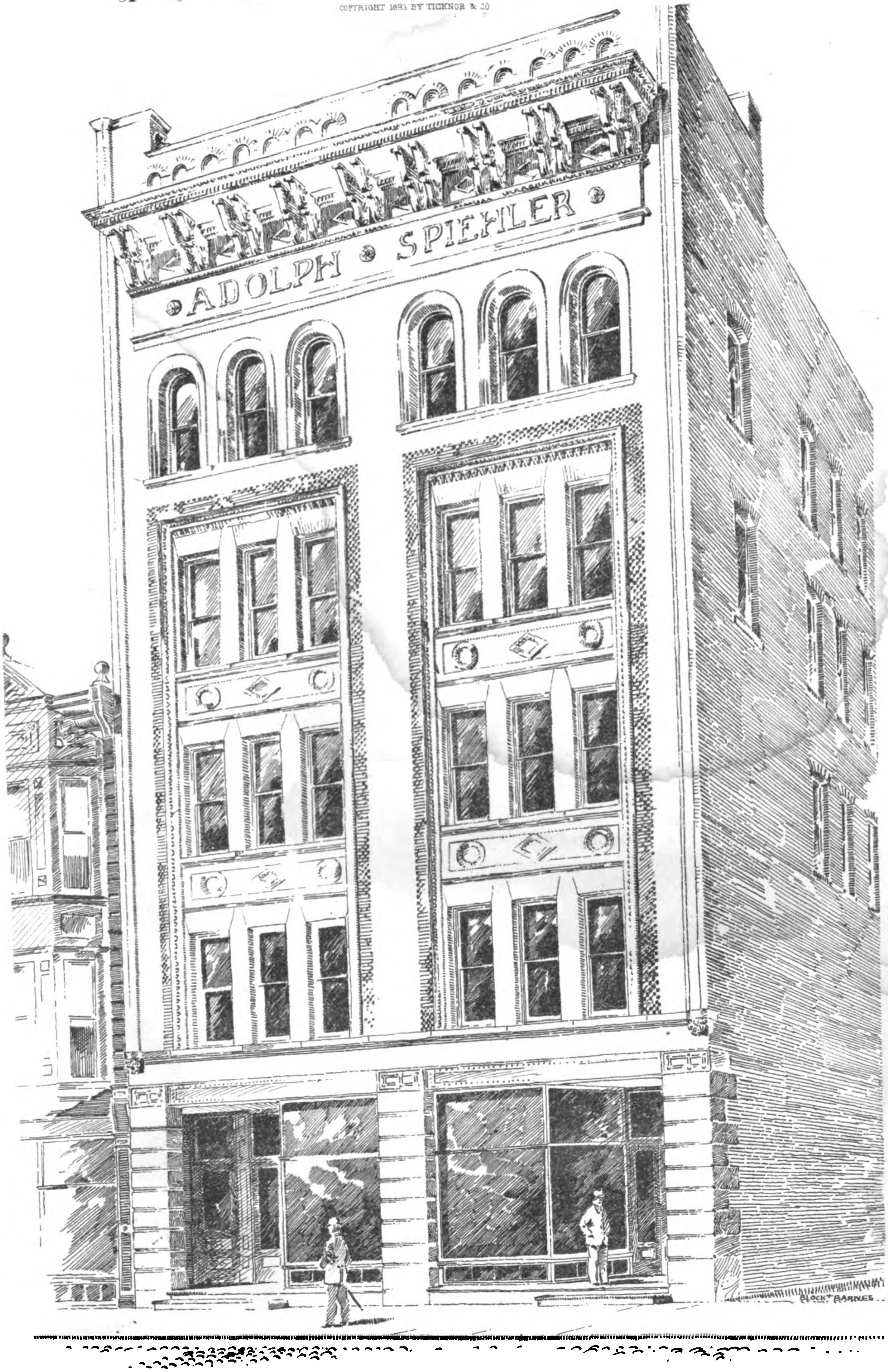



THE SCHOOL HOUSE
BAY RIDGE, L.I.
PARFITT BROS. AND WM. A. BATES. ASSOCIATED ARCHITECTS.
J.A. JOHNSON 93

AMERICAN ARCHITECT AND BUILDING NEWS, NOV. 25, 1893. No. 935.



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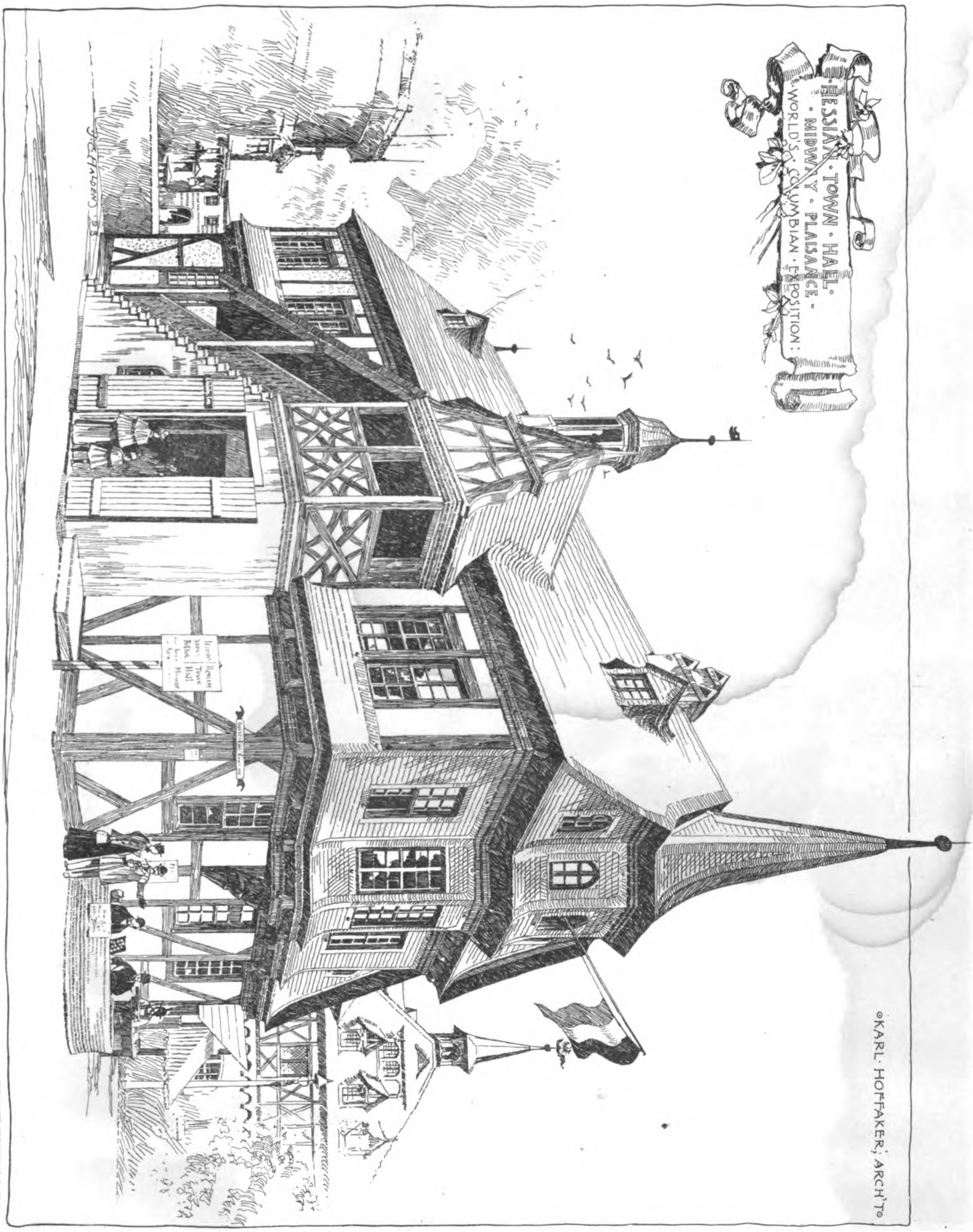

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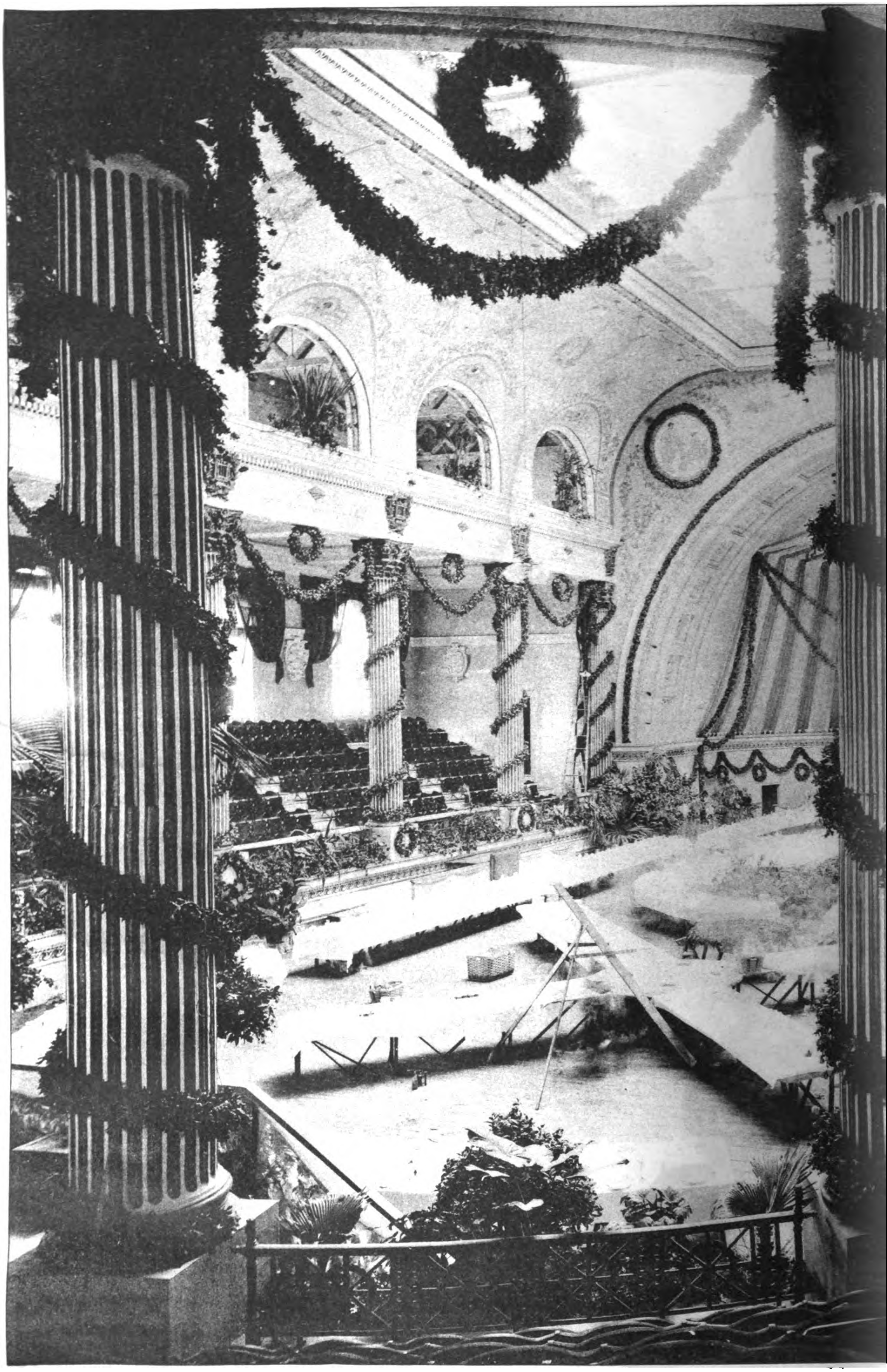

THE MUSIC HALL, PREPARED

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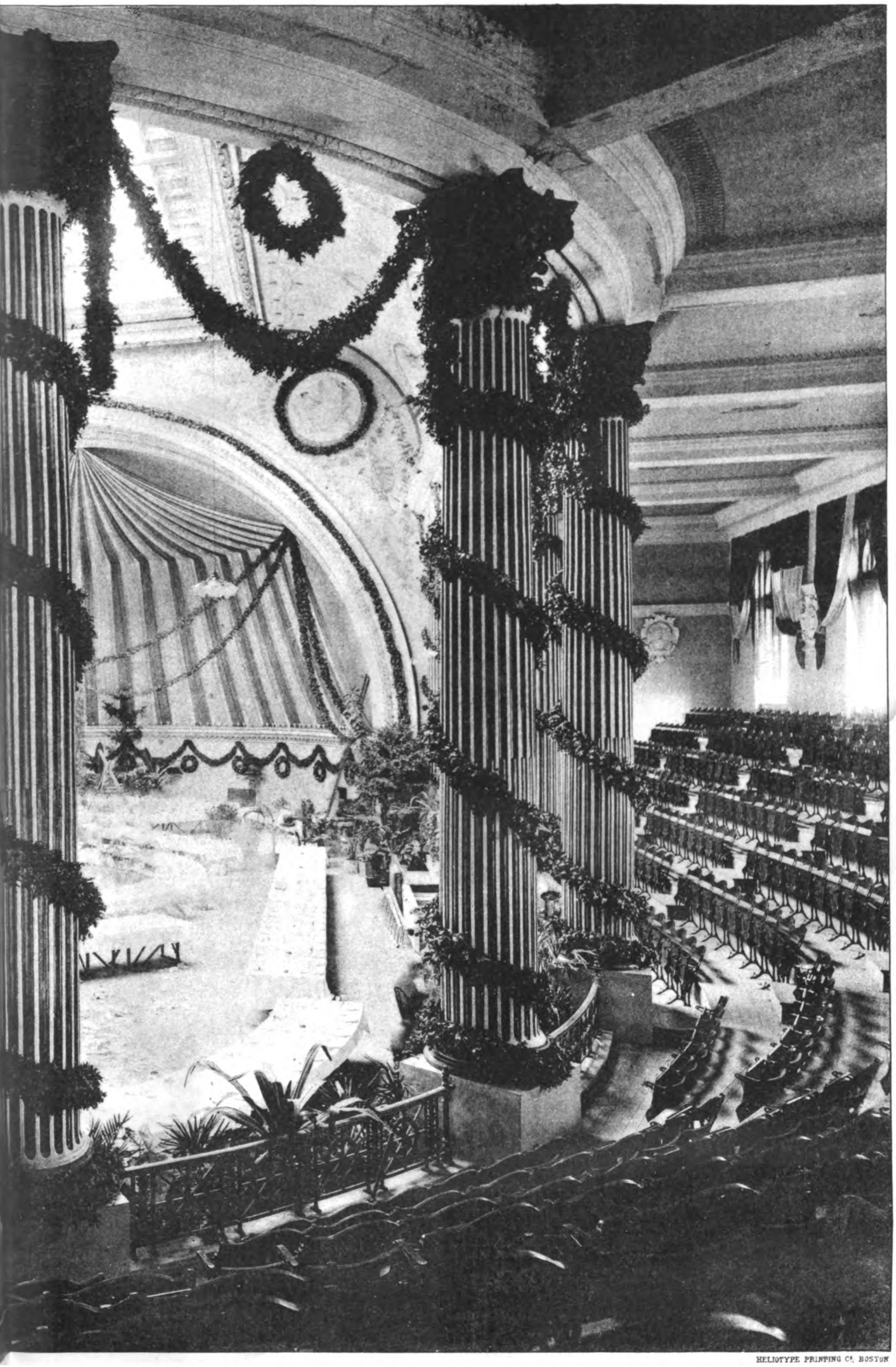

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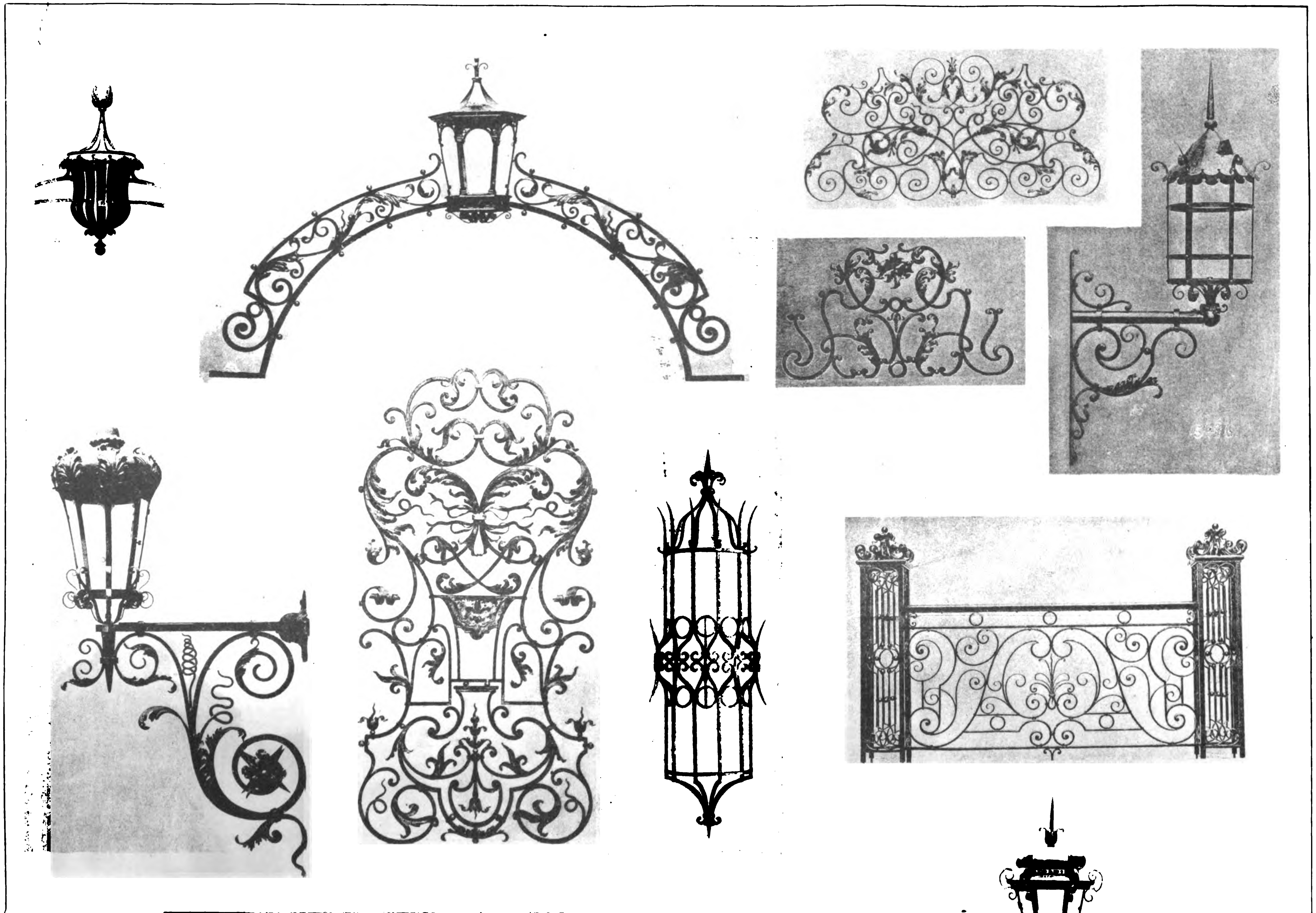

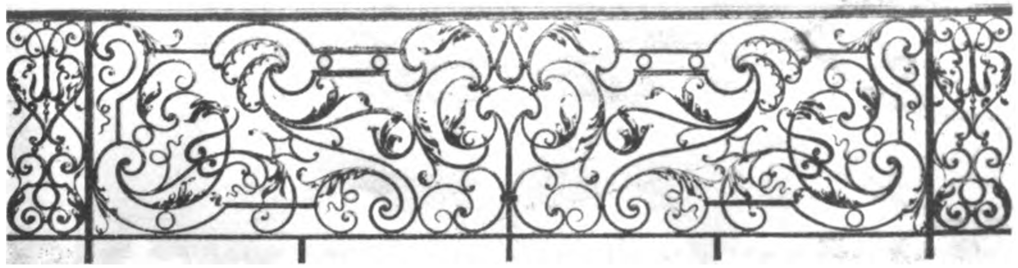

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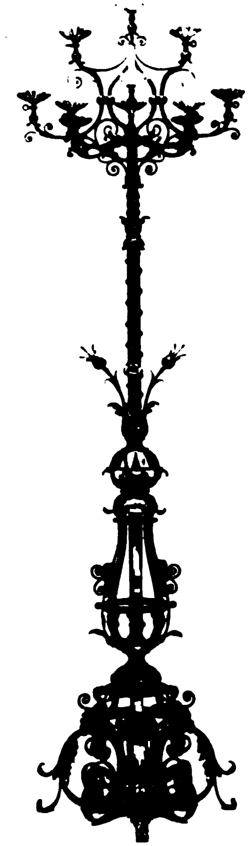

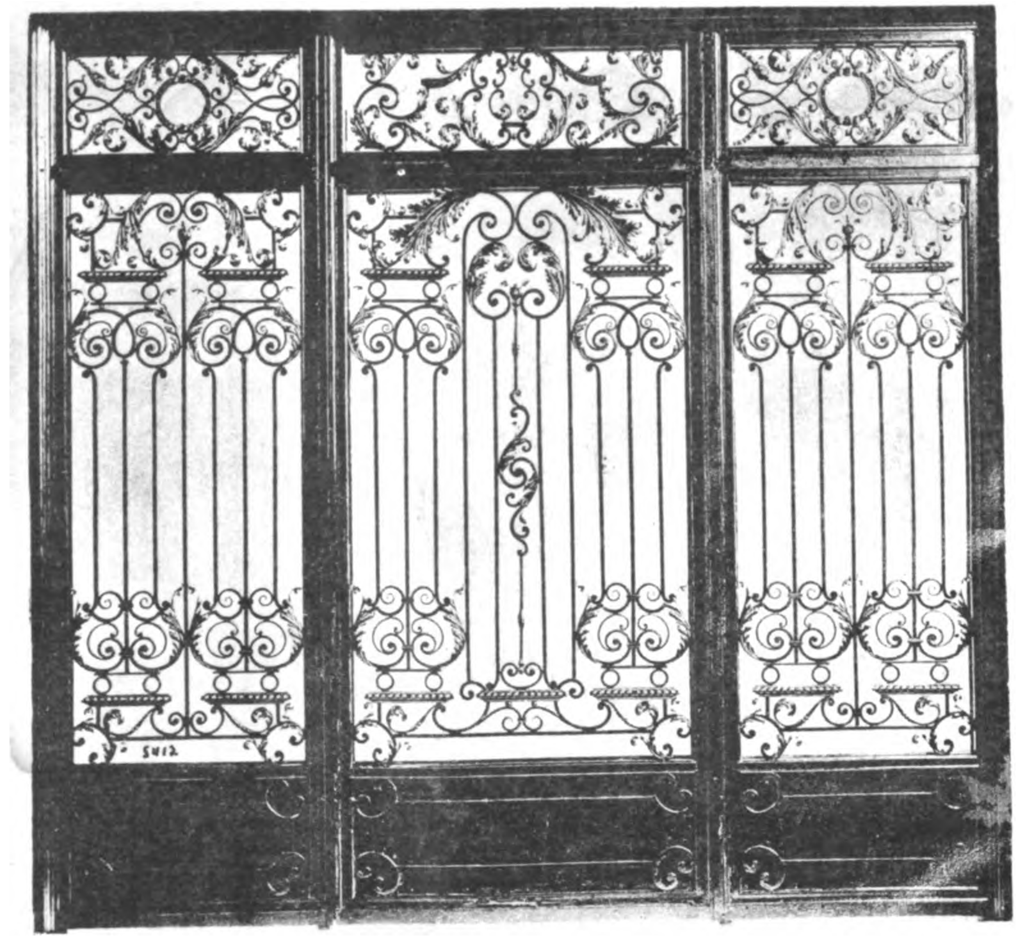

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THE AMERICAN ARCHITECT AND BUILDING NEWS.

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DECEMBER 2, 1893.

CONTENTS

FROM this time forward, we regret to announce, there will be missed from our pages a name long and honorably known by those familiar with the best literature in the language. Finding it impossible to at once extricate themselves from the embarrassment in which the recent commercial depression has involved them, Messrs. Ticknor & Company, who for a number of years have been publishing this journal under a lease, have been obliged to surrender their leasehold and henceforward the *American Architect* will be conducted by its owners. At the same time a change in actual ownership also has been effected and the editors, who hold the controlling interest, have now associated with them as stockholders a large number of architects whose common aim and object it is, not to publish the journal for their selfish personal profit or for the greater exploitation of their own designs, but merely to lend the weight of their influence and more frequent assistance in aiding the editors to advance the journal to a higher plane of usefulness to the members of the profession in every part of the country — or of the world, for that matter. In what manner it will be possible to best avail of this new impulse must be determined later, when it has been discovered how much more willing the members of the profession at large are to join now in supporting and advancing this journal to a higher degree of common usefulness than when it was understood to be carried on by a publisher as an ordinary money-making enterprise. It has been so generally known that the *American Architect* was a prosperous and profitable piece of property that it has not been possible for us to feel aggrieved at a tinge of aloofness that we have felt of late growing up between us and the men we have for nearly eighteen years striven to serve. It was easy to understand that subscribers might feel that the first effect of a greater cordiality of coöperation would be only to increase the trade profits of the publisher, while it was not so certain that it would produce any secondary effects in the way of improvements which would be of direct benefit to themselves. If any one ever has entertained this idea, it was one entertained without warrant of fact, for the publishers have always done as much for the journal as any one could rightfully demand, while there have been times when they have generously sacrificed a greater part of their fair profits than was proper.

WHEN such a change takes place as that to which we now refer, it is usually made the occasion for a display of new energy, a making of radiant promises, an abandoning of old methods and the initiating of new "features," chief amongst which is most frequently mentioned a "new suit of types" or a "new dress." We have no intention of making any glowing promises or initiating any radical changes at this moment. In the first place, the general tone of the times calls for a discreet conservatism, and in the next place, the obligation we are under to carry out the late publishers' contracts with their subscribers and advertisers is no slight handicap to what is, indirectly, a new start, so, while we have only the most amiable of feelings towards them, we can hardly be expected to give them better treatment under an existing contract than that contract calls for. We must at any rate await the opening of the approaching year, which we trust and believe will be a more nearly normal period than that which is just closing. If, however, an indication of our intentions is necessary, it may be enough to declare that it is our hope that, through and because of the broader professional base on which the journal now rests, it may be possible to make its average performance in the future equal what in the past has been its best.

THERE is one serious matter to which we must be allowed to refer. There are published in this country at the present moment somewhere between fifty and eighty "building papers" — we do not know with precision their birth-rate or longevity, so we state the situation broadly — and it is incredible that such a number of papers are needed by or are really useful to the building fraternity. Although it is a delicate matter, there is no good reason why we should not say that it would be a great benefit, to all but the few owners who get their living by these publications, if more than three-quarters of these periodicals could be persuaded to give up the attempt to "fill a want" which does not exist. There is enough of good and interesting material in this country to supply a few periodicals in so acceptable a manner that all parties concerned would be gratified and satisfied with the result, but when this same matter is, as now, parcelled out more or less indiscriminately amongst fifty or eighty periodicals, it is obvious that not one of them can be as satisfactory as circumstances otherwise would allow it to be. It is an unwholesome competition and a wasteful one, yet, as the promoters may possibly get a living out of them, it cannot be said that any of these ventures is not legitimate, while it distinctly can be said that there are very few of them which do not show capacity on the part of their conductors to do good work, if the opportunity allowed. But it is our sincere belief that there is no real promise of success for these struggling journalists. Out of fifty of these journals there are forty-five at least, any one of which is just as promising, just as likely to live and succeed as the others and not a whit more so. The struggle is inevitably to result in a survival of the fittest, but what a waste is entailed in the conflict and how unjustly are the ultimate survivors crippled meanwhile! It is not the subscription-lists of these journals that keep them alive, of that you may be sure: the breath of life is furnished by the short-sighted policy of advertising manufacturers and dealers, and until these can bring themselves to believe that, in a restricted field such as that occupied by the building fraternity, it will do them more good to divide their advertising appropriations amongst the leading journals than to give it out in small morsels to every one who applies for a share, the real usefulness of the leading journals to them will remain much less than it legitimately should be.

THE moral of the present situation, so far as our subscribers are concerned, and it is a moral upon which we desire to lay particular stress, is this: The nature of the commercial situation is such that some of our subscribers may not unnaturally feel inclined to practise a small economy by stopping their subscriptions altogether or by changing from the more expensive editions to the cheaper, without stopping to consider how such a course will act on us and react on them. The income from subscriptions is very far from being enough to meet the fixed charges of conducting even a much less expensive periodical than the *American Architect*, and so the income from advertising is a necessity — and incidentally we will point out that as the subscribers receive a large return from the advertising income, it is for their merely selfish interest to make advertisers clearly understand that they value

their coöperation. The advertising income is peculiarly sensitive to changes in the commercial situation and the recent panic has already inflicted on us a serious loss. The economy effected by an advertiser who by the stroke of a pen can stop the outgo of two or three hundred dollars is more natural and more legitimate than one which saves a twentieth of the amount by stopping a subscription. But little can be done at the moment to recover the support of the advertising manufacturers, so it is all the more desirable that the present subscribers should be brought to believe that their own permanent interest is largely involved in their aiding to maintain this journal at its present state of efficiency, at least, so that it may be able to make progress as soon as the business "boom" sets in, and may not find itself at that moment incapable of taking advantage of the situation through having to catch up with obligations already incurred. The fixed charges in the way of salaries and preparations to print the first copy of an issue are fixed and unalterable, whether the amount of the edition be big or little, and it is to enable us to meet these fixed charges that each present subscriber's loyalty to the common cause is at this time invoked.

WHEN a man in public life has proved by his deeds that the office he fills is one which is exactly suited to his capacities, it is a disgrace to our reputation as a self-governing people that he should be forced out of it against his will or allowed to leave it voluntarily, if in any way he can be induced to stay in it. Mayor Matthews, of Boston, has proved himself in his three years of active and useful service one of the best of Boston's long line of capable and upright mayors, and though it is not our habit to attempt to influence the movements of things political, we feel we must exert what little influence we may possess in the cause of his retention in the mayorial chair for at least three years longer. The masterly, if at times rather masterful, manner in which he has discharged his duties generally, would call for commendation under any circumstances, but there is one of his most masterful acts which we wish especially to applaud, and it is that this act may have its legitimate fruition that we hope to see him re-elected, at least, twice more. Before he came into office the interests of the city in all those matters that fall under the care of the City Architect had long been discharged in a particularly feeble way — not to characterize the manners and methods obtaining in that office in any stronger words. One of Mayor Matthews's first acts was to place at the head of the architectural department Mr. Edmund M. Wheelwright, a young man who had until then encountered in his professional work nothing of an unusual character, yet a man who was known by his friends to be admirably fitted for the public office he was called to fill. The effect of a good business administration of the city's building work was fairly startling the first year, when considered from the standpoint of economies effected and, naturally, this was not pleasing to the politicians at the City-hall, so that when in the following year Mr. Wheelwright's name came up for confirmation, the aldermen declined to confirm the appointment, and as the mayor declined to name anyone else and as such functionaries remain in office until their successor is appointed, Mr. Wheelwright has for the last two years discharged his duties as a mere "hold-over," retained in office first by the mayor's determination and second by the unqualified approbation of the intelligent public.

DURING his term of office Mr. Wheelwright has been called on to build an unusual number and variety of municipal structures and in almost every case he has acquitted himself with marked success, not only in the matter of economy and executive capacity shown, but still more in the matter of their artistic treatment. Consequently we believe that there are few places in this country where the new buildings belonging to the municipality bear such evident marks of refinement and artistic feeling on the part of their designer. The best piece of design that he has produced, one which we have once before characterized as one of the best pieces of designing produced in Boston in late years, is the design tentatively made a couple of years ago for a new city-hall on a proposed site near the top of Beacon Hill, and it is because the original project has lately been revived in such a form that a city-hall is likely, eventually, to be built there that we feel we ought to do what we can to make sure that Mayor Matthews and his hold-over architect may be continued in office for at least three years more. Mr. Wheelwright has given proof in the work he has accomplished that he is capable of working up an already good design into a structure that shall impress observers by its refined sobriety as being exactly the sort of public building Boston ought to have.

A PARAGRAPH is circulating through the newspapers, which will bear repeating, with comments, for the benefit of more expert readers. The paragraph simply gives the formula adopted by the United States Lighthouse Engineers for a wash, to be applied to the walls of lighthouses, and similar structures, to keep out moisture. As now used, this wash consists of three parts Rosendale cement to one part sand, mixed with fresh water to the proper consistency for applying with a whitewash-brush, and well stirred during the process of application. The color will vary from brown to gray, according to the color of the cement and sand, but a little lime may be put in to whiten it, or it may be tinted with Venetian red. The wall on which the wash is to be used must be well wet before applying it. So runs the receipt for newspaper readers. For those who really wish to use a cement wash, and want it good, many details must be added. In the first place, the quality of the cement is of essential importance. Much of the "cement," or so-called "Rosendale cement" sold, particularly in country towns, is no better for this purpose, or, indeed, for any other, than so much mud. Even if originally good, it is kept until it has become air-slaked and worthless, but much of that sold at retail never had any value whatever, being simply used by country masons to fulfil contracts for "cement" work, without regard to the work itself. Bearing this in mind, tolerably good washes may be made with fresh Hoffman, Norton, Newark and Rosendale, or other first-class Rosendale cements, but far better ones are made with Portland cement, which, like the Rosendale, must be fresh, and of the best quality, or it will be useless for the purpose. In most cases, we should leave out the sand, and use only the neat cement, mixed with the proper quantity of water. There is no economy in using sand with the cement, but the reverse, as the clear cement can be put on in a coat nearly as thin as a coat of paint, while, if sand is mixed with it, a thickness at least equal to the diameter of the sand grains must necessarily be given to the coating. Probably this is the reason why the sand is required by the Lighthouse Engineers, as the extra thickness of coating insured by its use is of value in resisting the severe tests to which the wash is subjected. In any case, the direction to wet thoroughly the wall to which the wash is to be applied must be strictly followed. It cannot be too wet, provided the water is not actually running down the face of it, and, if it is not wet enough, the cement-wash is sure to chip off. Portland cement requires, if possible, a wetter surface than Rosendale, and, after the coating has set hard enough not to wash off, it is advantageous, in hot, dry weather, to sprinkle the surface, so as to insure the presence of sufficient water for the perfect crystallization of the cement. When well put on, such cement washes are of great value. It is quite common for the side walls of houses built in the middle of a block, before the erection of the adjoining houses, to absorb water, often to such an extent as to ruin the interior plastering and decorations. In such a case, a wash of Portland cement generally effects a cure, and at a fraction of the cost of two coats of paint, or of the treatment with hot wax which is sometimes adopted.

THE spot on which the Paris Exposition of 1900 shall be held is reported to be fixed, and the exhibition itself is assured, and active preparations for it have already begun. By order of the Minister of Commerce, on the recommendation of M. Alfred Picard, the Commissioner-General of the Exposition, M. Bouvard, the Inspector-General of Architecture to the City of Paris, has been appointed Director of Architecture to the Exposition; M. Delaunay-Belleville, President of the Paris Chamber of Commerce, is appointed Managing-Director, and Vice-President of the Committee of Directors; M. Dervillé, President of the Tribunal of Commerce, is appointed Associate Managing-Director, with special charge of the French section of the exhibition, and M. Huet, Inspector-General of Roads and Bridges, and Director of Public Works for the City of Paris, is to have charge of the parks, gardens and roadways, drainage, water-supply and lighting of the Exposition; while M. Grison, the Director of Finances of the Exposition of 1889, is to manage also the finances of that of 1900.

MUSEUMS.[1] — II.

A PROVINCIAL museum is rarely ever set apart exclusively for the fine arts. Usually, a library or a natural history collection is connected with it. However, certain cities, like Laval, have galleries reserved chiefly for sculpture and painting. The Museum of Laval (Figs. 7, 8, 9), includes sculpture, of specimens of zoölogy, ethnography and archæology, as well as a library. The plans given here, with the legend, show the distribution (Fig. 11). The picture-gallery, in the first story, is divided into three rooms, lighted from above. The whole building is excavated. The floors of the first story are laid on T-irons, with brick vaults. The area of these new galleries, in each story, is 512 square metres.

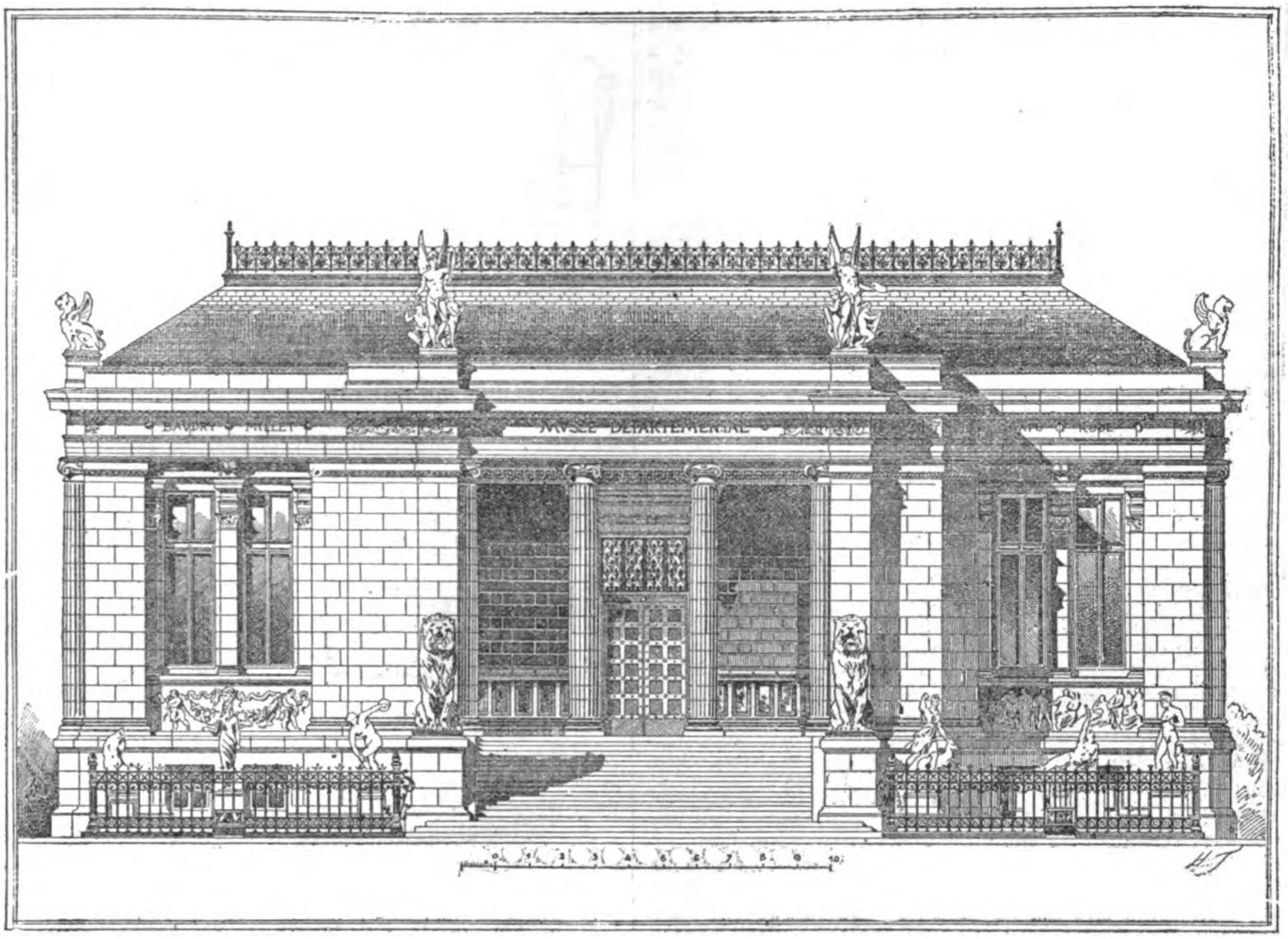


Fig. 7. Museum of Laval.

a peristyle with loggie for guards, a sculpture-gallery, three galleries for paintings, one longitudinal gallery for antiquities and casts, another devoted to archæology and lastly a gallery similar to the sculpture gallery for the exhibition of architectural casts.

Among the finest provincial museums, from an architectural standpoint, is the Palace of Longchamps, at Marseilles, built by Espérandieu, who gathered inspiration from the advance plans of M. Bartholdi. It has a development of 135 metres on the front. In the centre is the *château d'eau* which distributes the waters from the Durance Canal; on the left is the Museum of Painting and Sculpture; on the right, the Museum of Natural History (Fig. 10). The picture-gallery contains nearly five hundred paintings.

At Rouen, one building is destined to hold collections of paintings and ceramics and a library. It contains six hundred pictures and was constructed by M. Sauvageot.

The Museum of Douai is less important; the works were too closely packed in an old convent, but the quarters have

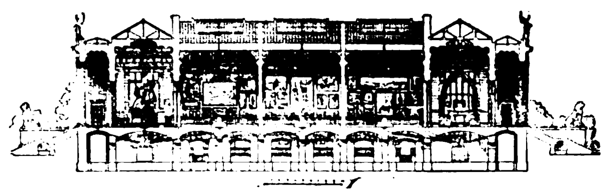


Fig. 8. Museum of Laval.

been recently transformed and enlarged by means of new galleries. The ensemble includes collections of painting and

[1] From the French of E. Rümler, in Planat's *Encyclopédie de l'Architecture et de la Construction.* Continued from No. 935, page 97.

A museum should always be built above cellars, in order to avoid the effects of dampness; it should be protected as far as possible from the danger of fire. The building should then be of incombustible materials, and careful provision should be made for water and the necessary relief stations.

As to the special dispositions required for paintings and sculptures, the only principle to be insisted upon is lighting from above. It is necessary also that the glazed ceilings through which the light is admitted should be double, so as to avoid any inconveniences that might arise from the breakage of glass and also to establish a cushion of air that will maintain a temperature suited to the canvases, which are equally sensitive to the heat of the sun and to too severe cold.

To show, moreover, what demands are made upon archi-

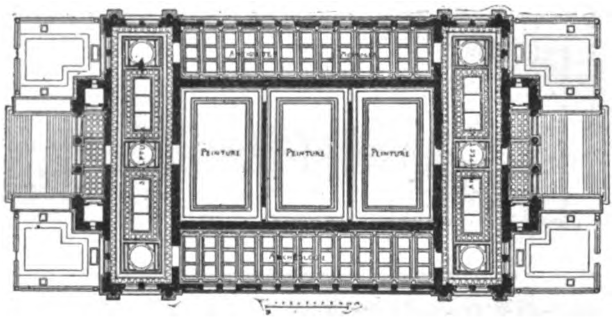


Fig. 9. Museum of Laval.

tects in the construction of a museum of fine arts, we give the conditions imposed for the construction of the two new museums of Nantes and Bayonne.

At Nantes, the total surface of the museum of painting and

sculpture is about 5,000 metres. It comprises an underground story, a ground-floor, a first-story and roofs. The space reserved for paintings is 2,700 square metres, corresponding to 900 linear metres of moulding. The lighting is from the roofs.

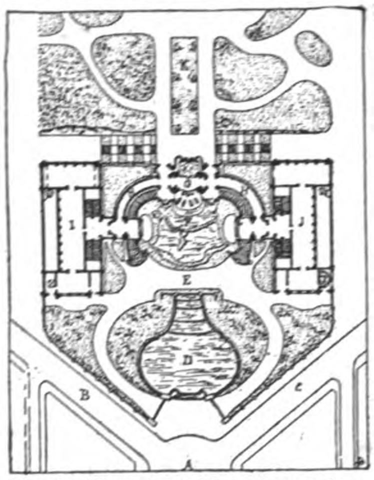


Fig. 10. The Palace of Longchamps, Marseilles.

A. B. C. Approaches; D. Fountain; E. Terrace; F. Cascade; G. *Château d'Eau*; H. Colonnades; I. Museum of Fine Arts; J. Natural History Museum; K. Garden.

However, for the small rooms, side lighting is not absolutely proscribed. There is a hall for the exhibition of drawings and engravings, as well as a room for collections of art books and works and photographs. There are besides, the curator's office, two suites of rooms for guards, with cloak-rooms and water-closet, a consultation-room for the board of managers, store-rooms and a restoring-room.

The museum-library of Bayonne contains: for ancient and modern archives, a suite of rooms with a total area of 300 square metres; for the library, apartments having a surface of 600 metres; for the natural history museum, galleries of 500 square metres; for painting and sculpture, galleries of 600 square metres; and quarters for the concierge.

Museums not designed for painting and sculpture may present the most varied plans, according to the purposes which they serve. Light from above is not indispensable here, as the objects exposed are generally in glass cases which should be lighted on all sides. The disposition in long galleries, with bays on both sides is, therefore, the best and the one most usually adopted.

Such is the Museum of Religions at Paris (Fig. 12). The main façade is 70 metres long, the lateral 50 metres. To complete the triangle, there remain to be constructed the buildings which are to join these two. We have, however, indicated them in the plan. The edifice has three stories, connected by the angle rotunda in which are the administration-rooms and work-rooms, the office of the director and curator and the libraries.

We now attempt, in schools of art or applied art, to place within reach of pupils such collections as may guide them in their studies. The School of Decorative Arts is connected with the museum of the same name. The Gobelins, the manufactories of Sèvres, Limoges and Aubusson possess, for the instruction of their artists and of the public, galleries in which the most remarkable productions of these various industries are exhibited.

At Aubusson, it was, however, impossible to install the museum by the side of the factory. In constructing it the foundations and a few walls of the old feudal castle were utilized. This is indicated in our plans (Fig. 13), in which

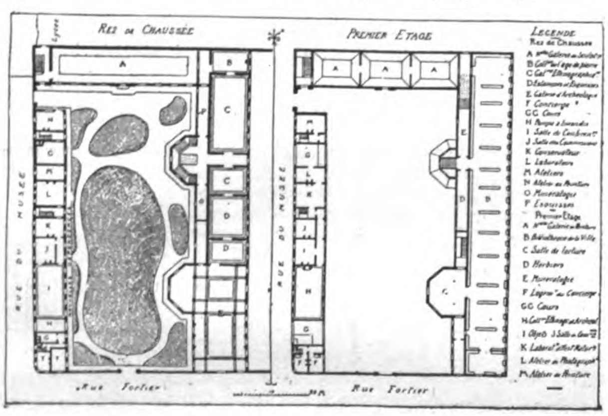


Fig. 11. Museum of Douai.

the simple disposition of the grand vestibule and of the exhibition hall of the tapestries will be remarked.

Before turning our attention to a last class of museums, we give the plans of a curious structure containing collections of every kind, artistic or industrial. This is the new museum of South Kensington, at London (Fig. 14). It was instituted after the first international exhibition, and in it all sorts of things were collected, furniture, objects of art, libraries, etc. It has just been reconstructed after the designs of Mr. Webb, with a convenient and symmetrical disposition. The legend of the two plans which we give indicates the great variety of the exhibits.

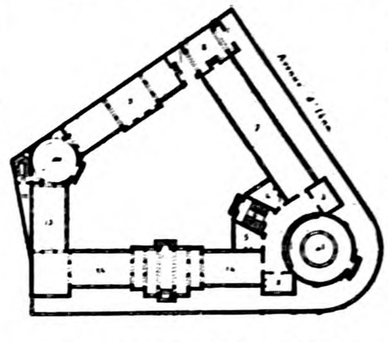


Fig. 12. Museum of Religions, Paris.

1. Rotunda; 2. Concierge; 3. Secretary's Office; 4. Water-closet; 5. Guard; 6. Stairway; 7. Lecture-room; 8. Corridor; 9. Chinese Room; 10. Vestibule; 11, 12. Service; 13. Japanese Room; 14. Extreme Orient.

The artistic industries are not the only ones that attempt to connect their schools or manufactories with museums and collections. The technical sciences and industries also have their exhibition rooms.

One of the oldest institutions of this kind is the Conservatoire des Arts et Métiers, at Paris. It was founded in the time of the Revolution, on the site of the Abbey Saint-Martin-des-Champs. New galleries have been added to the former buildings, but they present no peculiar features.

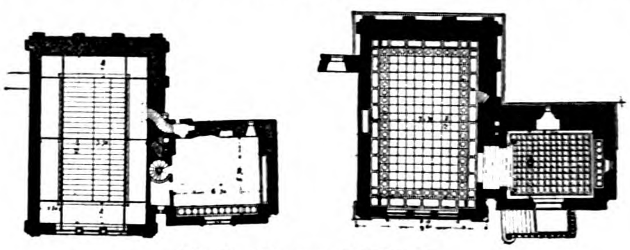


Fig. 13. Museum of Aubusson.

In them are exhibited the most varied industrial products and models. The lighting is sometimes from one side, sometimes from two; the latter is far preferable.

An industrial museum has been newly erected at Stuttgart: the centre of the composition is occupied by a large glass-roofed court for special exhibits. Around this are grouped the rooms for the permanent collections of the museum (Fig. 15). The edifice is in three stories. The legends indicate the distribution of the ground-floor and of the first-story. The second-story is mainly occupied by offices, work-rooms, secondary libraries, and the stack-rooms of the large library in the lower story immediately below them. This museum, which is hardly finished, may be considered as a typical structure.

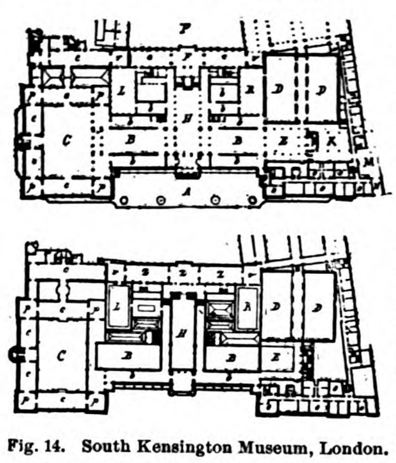


Fig. 14. South Kensington Museum, London.

A. Grand Entrance Court; B. Hall of European Art; C. Hall of Oriental Art; D. Architecture; E. Students' Exposition Hall; F. Gallery of Contemporary Industrial Products; H. European Collections and Entrance Hall; K. Unpacking Room; L. Library of Ancient Teachings; M. Open Court for Students' Work; N. Private Entrance; P. Present Quadrangle; *bb*. Galleries of European Art; *cc*. Galleries of Oriental Art; *oo*. Management and Attendance; *pp*. Pavilions; *vv*. Vestibules; B. C. D. E. F. H. Upper parts of the Divisions indicated in the Ground-plan; *bb*. Galleries of European Productions; *cc*. Galleries of Oriental Productions; *oo* Management and Services; *pp*. Pavilions; *v*. Vestibules; *zz*. Photographs and Catalogues.

Several examples of museums will be found in this encyclopædia. Thus under "Modern Architecture" [*American Architect* for July 2, 1892 *et seq*] may be seen the Mappen Art Gallery at Sheffield (Fig. 4), South Kensington Museum (Figs. 6, 7), Museum of Hanover (Fig. 20), Museum of Vienna (Fig. 32), of Budapest (Fig. 38) and of Neuchâtel (Fig. 42). The plan of the British Museum will be found under the head of "Libraries" [*American Architect* for October 17, 1891, Fig. 5]. The plans and views of the museums of Vienna appear under "Austrian Architecture" [*American Architect* for January 24 and February 7, 1891, Figs. 13, 30].

E. RUMLER.

ARTIFICIAL ILLUMINATION.

NUMEROUS and varied are the methods employed at the present day for obtaining artificial illumination. Leaving out of consideration the electric-light which occupies a position by itself, we may, broadly speaking, distinguish between solid, liquid and gaseous illuminants, of which the candle, the oil-lamp and the gas-flame are representative forms.

It would be interesting and instructive to trace the history of the different kinds of artificial light employed both in domestic and in street lighting at various periods of history, and to follow the successive improvements in lighting introduced by men of talent and inventive genius. It seems indeed a gigantic step forward from the crude methods of lighting employed by the ancients to the gas-light and the electric-light of the nineteenth century. But the glow of the camp-fire, the light from blazing logs, or from torches made of

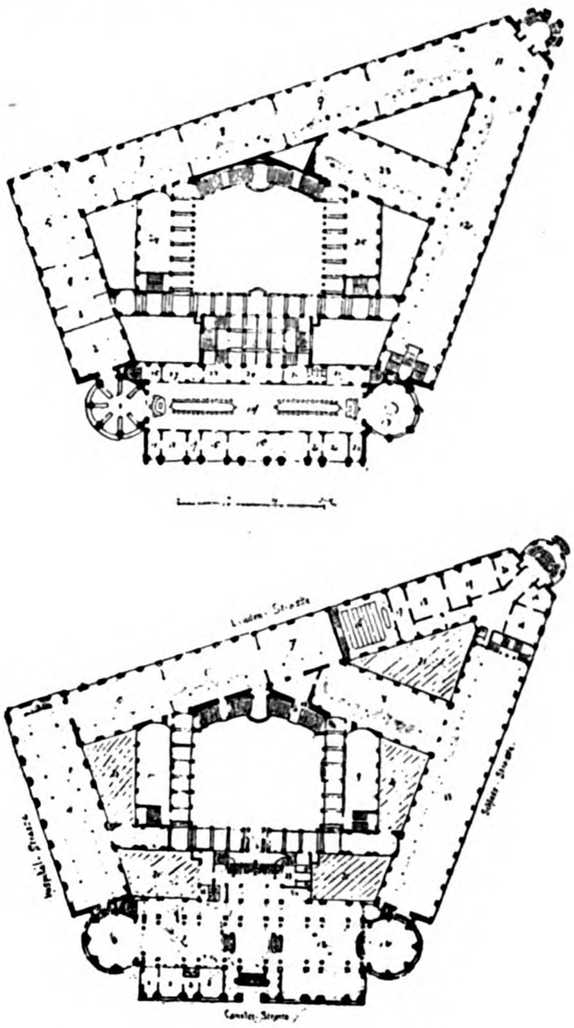


Fig. 15. Industrial Museum, Stuttgart.

Ground-plan: 1. Vestibule; 2. Offices; 3. Patents; 4. Machines; 5. Electrotechnics; 6. Tools and Models; 7. Raw Materials; 8. Hygiene and Relief Services; 9. Chemical Products; 10. Woodwork; 11. Glass-roofed Court; 12. Exhibition of Decorative Art; 13. Agriculture; 14. Physical Apparatus; 15. Scales; 16. Chemical Room; 17. Preparations; 18, 19. Laboratories; 20. Inscriptions; 21. Courts; 22, 23, 24. Porter, Cloak-room. *First-floor Plan:* 1, 2. School Appliances; 3. Household Utensils; 4. Leather Goods; 5, 6. Metallic Productions; 7. Instruments of Precision and Weapons; 8. Ceramics and Glass; 9, 10. Textile Industry; 11. Printing and Graphic Arts; 12. Plaster Models; 13. Drawing; 14. Reading-room; 15. Newspapers; 16. Librarian; 17. Entrance; 18, 19. Secretary; 20, 21, 22. Clerks; 23. Construction and Civil Engineering; 24. Paper and Paper Manufacture; 25. Wooden Articles; 26. Guard; 27, 28. Books, Accounts; 29. Cloak-room; 30. Lavatories; 31. Despatching Room.

splinters of resinous wood, as exclusively employed by our forefathers, may even nowadays be found in use by the Indians and other uncivilized tribes. It may, therefore, be said that the means for artificial illumination employed at the present time are an indication of the more or less advanced state of civilization of a nation.

The burning log and the blazing resinous pine torch are the oldest and crudest methods of lighting. Oil was burnt by the Phœnicians, the Greeks and the Romans in primitive forms of open-vase lamps, into which a cotton or flax wick dipped.

The Romans used the first candles in the form of rushes covered with wax or tallow, or of rope saturated with pitch or resin. These candles were gradually improved and formed, during the Middle Ages, the principal means of church illumination, and were likewise used in castles at court festivals. Later on, the smoky and ill-smelling tallow candle was replaced by the better forms of drawn or cast candles, made from sperm, paraffine, wax and stearine. The modern improved candle differs from the candles employed in the last century principally in the method of manufacturing the wick, which as the candle grows shorter in burning, is consumed and reduced to ashes, thus rendering the use of the "snuffers" of our grandfathers, which many of us still may remember, unnecessary.

The rude forms of lamps employed by the Romans and Etruscans have been gradually displaced by lamps of improved construction, with closed oil-reservoirs, improved wicks and variously shaped burners. Argand invented and developed the round form of burner and wick, the oil ascending from the reservoir into the wick and to the tip of the burner by capillary attraction. Carcel made further improvements by placing the oil-reservoir at the bottom of the lamp, where it would not throw a disagreeable shadow. In this form of lamp the oil has to be forced up to the wick by means of a pump, or in the later "moderator" lamp, by a spring acting upon a leather plunger. The liquid illuminant employed in these lamps was either colza oil, olive oil or some other vegetable oil.

Still later, and belonging to the present century, came the use of kerosene or mineral oil in lamps, this illuminant being a liquid improved by distillation and refining, which operations remove the more volatile, highly inflammable and, therefore, dangerous ingredients of the oil.

Equally as varied as the means employed for domestic illumination have been those in use at different periods of history for the lighting of streets, highways and public squares. In the larger cities the darkness of the evening hours was at first dispelled in a measure by the use of torch-lights, or of candles burnt in glass-lanterns, which were either carried by hand or hung out from windows. Later on, the candle-lanterns were replaced by oil-lamps, with wick and reflector, and these in turn were superseded by the introduction, at the beginning of this century, of coal-gas burned in street-lanterns, while to the gas-light now so universally employed, both for domestic and street lighting, a formidable rival has during the past ten years arisen in the electric arc-light and the incandescent electric glow-lamp.

Wonderful as have been the many and rapid improvements made in this last form of illumination, viz, the electric-light, it must be admitted that the progress of gas-lighting has been no less astounding. The present generation who have witnessed the ascent of the electric-light have become so accustomed to the use of the ever-ready gas-flame, that few are probably aware of the difficulties which beset the path of the talented men of science who created and introduced lighting by gas. It is a matter of historical record that when Murdock, one of the pioneers of gas-lighting, appeared in 1809 before the House of Commons Committee, he was asked by one of the members of the Committee, "Do you mean to tell us that it will be possible to have a light *without a wick?*" and upon his replying, "Yes, I do indeed," the same person replied, "Ah, my friend, you are trying to prove too much." We are also informed that Samuel Clegg, an engineer to whom the world is indebted for many important improvements in gas-manufacture and gas-distribution, was sarcastically asked by Sir Humphrey Davy, who considered the idea of public gas-lighting ridiculous, if Mr Clegg intended to take the Dome of St. Paul's for a gasometer. The great Napoleon laughingly remarked of gas-lighting, "*C'est une grande folie,*" and Sir Walter Scott considered it a visionary scheme and expressed fears that "London would be on fire by it from Hackney Gate to Tyburn" [east and west extremities, then, of London]. Indeed, when the House of Commons was first lighted by gas, the astonished citizens of London were in such fear of burning their fingers when touching the gas-pipes for the conveyance of gas that they first carefully put on their gloves. When Westminster Bridge was first fitted up for illumination by gas-lamps, the lamplighters refused to light the lamps. In 1815, the London Fire Insurance Companies refused to insure buildings lighted with gas. To overcome their prejudices, Samuel Clegg invited the Underwriters to inspect the gas-works, and after explaining to them the process of gas-manufacture, and the method of storing the gas at the gasometer, he quickly took a pick and cutting a hole in the dome of the gas-holder, lighted the escaping gas without danger or explosion, and thus demonstrated to their satisfaction the comparative safety of the new light.

Many are the advantages of gas for household purposes, and its disadvantages are comparatively few, and for this reason it is probably more used in houses at the present day than any other form of artificial illumination.

Gas-light is relatively cheap, although kerosene oil, *per se*, is probably cheaper. But, in comparing gas and oil, one should not forget the additional cost caused by wear and tear and breakage of oil-cans, glass-chimneys and shades of oil-lamps. Gas-light is convenient, and saves domestic labor by being always ready for lighting, whereas lamps require preparation in filling and trimming the wicks, while time and labor are consumed in procuring candles or oil. Gas-light is superior in point of cleanliness to oil-lamps and candles, because there is no spilling of oil, no dropping of candle-grease, no greasy or oily hands from the cleaning of lamps; there is no smoking of candles, no offensive odor such as attaches to oils and fats.

Gas-light is brilliant, yet easily controlled, readily increased or diminished, and not difficult to manage by persons of ordinary intelligence. Gas-light is comparatively much safer than candles or lamps in which colza oil or kerosene is burned. The carrying about of candles or lamps, with the unavoidable danger from fire or from lamp explosions, is rendered unnecessary, as only a match is required to light the gas at the burner. Gas-light, finally, creates in

proportion to the light developed less disagreeable heat and is less unhealthful than candles or oil-lamps, where proper ventilation of rooms is provided. The increased illumination by gas-light in our streets, squares and parks, as compared with the former semi-darkness, has been a great protection to property and life, and the parks and alleys of our cities are not so much as formerly the haunts of the vicious and the criminal.

Incidentally I would call attention to the many other uses to which coal or illuminating gas has in recent years been put. Gas is used in heating rooms, heating sadirons, heating water; gas is employed for roasting, baking, steaming, frying, boiling and broiling; gas is adopted as fuel to drive small domestic motors, gas-engines of various kinds, gas and caloric pumping-engines, also for heating soldering-irons, and for various other industrial purposes, and, finally, it is extensively employed for artificial ventilation by means of gas-jets burning in exhaust-flues, or by the use of sun-burners.

More recently, with the arrival of the incandescent electric glow-lamp, much has been said about the injurious influence of gas-lights upon health, of the vitiation of the atmosphere of rooms, and of the destructive effects of gas, when imperfectly consumed, upon the furniture and decorations of a room, to say nothing of the smoking-up of ceilings and walls. But notwithstanding the rapid development of domestic electric-lighting, and notwithstanding also the recent return in dwellings to the use of oil-lamps, which on account of their softer and steadier light, are by many preferred for reading and sewing, and to the use of extensive and costly paraffine and wax candles in luxurious gilt or silver candelabras and sconces, a use dictated by the ruling fashion on account of the beautiful soft and mellow illumination obtained, the use of gas in dwelling-houses, offices and stores is undoubtedly so convenient and comparatively safe, that for many years to come it will constitute the chief means of artificial illumination.

To quote from R. H. Patterson's article on "Gas-burners and the Principles of Gas Illumination" in King's "*Treatise on Gas*": "Any one who learns from experience of human customs and affairs, will feel assured that gas-light, although perhaps with shorn honors, has still a long career of usefulness before it, and that the admirable improvements in its appliances made within the last twelve or fourteen years, will not be robbed of their usefulness by a shunting aside of the illuminant to which they have given a new economy and additional brilliance, and which still, as of yore, is of such vast and ever-ready service to mankind.

"Gas-lighting has undoubtedly been the most beautiful, and well-nigh the most useful triumph which human invention has yet achieved in the present century. For marvellousness it cannot vie with the electric telegraph; for utilitarian value it cannot rank with the steam locomotive and railways. Nevertheless, but for its commonness, even poetic genius would find a congenial theme in the process which evokes the 'spirit of coal,' and, converting it into a spirit of light, conveys it as an invisible fluid under our streets—rising from below, wherever required, in pillared jets, to displace the darkness of the night hours, and flood our roads and streets with a warm and comely radiance. No spirit of the mine, even in fairy tale, has so blessed mankind. Passing from our streets it enters our dwellings, both rich and poor, as an ever welcome and valued visitor, giving to the word 'home' a new attraction, brightening the dwelling, and enabling us to pursue our work, and to taste the enjoyments of common life, as if we could command the sweet daylight to attend us at our pleasure. Thanks to gas-light, there is no night in our dwellings save such as we choose for our own comfort. It has illumined the former darkness of our halls and crooked staircases. From the gaselier in the dining-room it has made sparkling the glass and silver on the festive board, and lit up the kind and jovial faces of the company, making banquet or homely board lightsome and merry; while in drawing-room or 'assembly' it has flooded the room or hall with a radiance but for which the dance would lose much of its gaiety, and beauty with its bright costumes would be shorn of its brilliance. In the bed-room, too, still more where there is helpless infancy or sickness—where child has to be watched, or some sore-pained and weary-hearted invalid has to be tended, longing at times for light to break the dull, drear monotony of night's darkness—there, too, has the 'spirit of coal' been a priceless boon; existing when not wanted, as a mere speck of light within the mellowed globe through which it shows softly as a spot of luminous haze; yet ever ready, on the mere turning of a tap, to spring instantaneously into full illumination." WM. PAUL GERHARD.

PRAISE FOR AMERICAN ART AND ARTISTS.—Dr. F. Lippmann, who is director of the wood-engraving and kindred departments of the Royal Museum of Berlin, and was sent to this country by the German Government to visit the Fair and make a general report on the art exhibit, said recently to a *Tribune* reporter: "America stands at the head in wood-engraving for illustrations. Some of the work turned out here is superb. I consider that I am fortunate to be able to get such a fine exhibit for Berlin, and I am sure it will teach us a great deal. I believe the United States has a great artistic future. Already your painters are developing a distinctive style. But where you excel now is in the line of decorations, interiors, finely-finished furniture and the like. Then your metal-work is very fine."—*N. Y. Tribune.*

TOPOGRAPHICAL AND ARCHITECTURAL HISTORY OF THE CITY OF MEXICO.[1]—III.

THE CITY OF THE CONQUISTADORES AND ECCLESIASTICS.

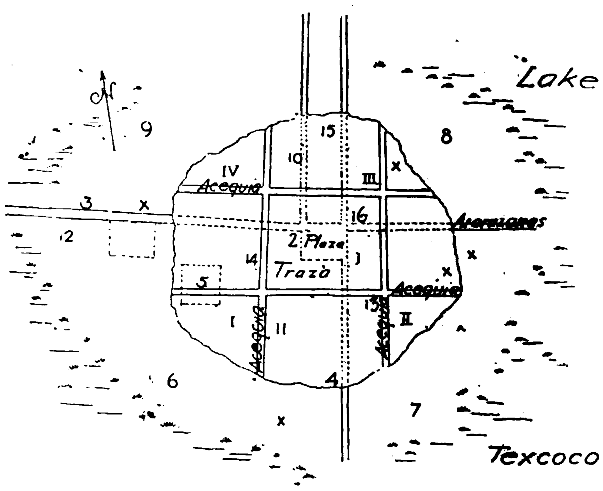
Seal of the City of Mexico. A Gold Shield surrounded by Nopal Leaves.

IN the Autumn of 1521, the island upon which Tenochtitlan had stood, was made bare of every vestige of the ancient pueblo and prepared to receive a city in accordance with the ideas of Cortés. It was contrary to the counsels of some of his followers, and in strange contrast with his usually good judgment, that the great Conquistador decided to build the new city upon a site invaluable to the Indians by reason of its defensive capabilities, but wholly incapable of meeting the needs of Europeans. The limited space secured for permanent occupation was enlarged by filling up the canals and extending the island in the direction of Atzcapotzalco. It was not thus that a firm foundation for a city was to be found, however. The city of the Spaniards was built upon a marsh covered by a thin crust of light soil, and in this marsh the City of Mexico has been burying itself, little by little, for more than three centuries.

The plan upon which the city of the Conquistadores was laid out, was in accordance with Spanish customs. It was that of a quadrangle nearly in the centre of the island marked off by canals, or *acequias*. Within this was a concentric square. Around this square and still within the quadrangle, the Spaniards were to build their houses. The Indians, to whom also Tlatelolco was assigned, might build outside the quadrangle. The Spanish quarter was called the *traza*. The present Calle Refugio was formerly known as Calle del Acequia. It runs along the north side of the present municipal building. Not unlikely it marked the southern boundary of the *traza*. If the *acequias* were equidistant from the plaza, we may lay out the *traza* with reasonable accuracy, and find it not a very large place.

A portion of the *traza* was set off for the church, for government buildings and for crown lands, and the rest was divided by lot among the various leaders of the Conquest. Two important sites fell to the lot of Cortés, that of the "new house of Montezuma," and that of a tecpan or communal clan residence, known as "Montezuma's old house"—the present southwest corner of Calles Tacuba and Empedradillo, directly west of the cathedral. Upon the first-named site Cortés built a large low house with four flanking towers, intending the same for his official as well as private residence. Herrera is authority for the statement that it was built of hewn stone and that 7,000 cedar beams were used for the interior.

The site of the *teocalli* was set apart for a Christian temple and, prior to 1523, a small church was erected thereon. On the authority of Clavigero, its foundations were "laid with the broken images of the Aztec gods." The present occupant of the site is probably the Sagrario. The municipal building upon the plot set



Plan of City of Mexico in Sixteenth Century.

1. Cortes's Palace.
2. " "
3. S. Hipolito Chapel.
4. Hospital, N. S. Concepcion.
5. San Francisco.
6. S. Juan Bautista.
7. S. Pablo.
8. S. Sebastian.
9. N. S. de la Asuncion.
10. Sts. Domingo.
11. S. Augustino.
12. S. Diego.
13. University.
14. S. Jose el Real.
15. Encarnacion.
16. Archiepiscopal Palace.

X. Various Churches and Convents Built in Sixteenth Century.
I. S. Juan Bautista.
II. S. Pablo.
III. S. Sebastian.
IV. N. S. de la Asuncion.

apart for it, on the opposite side of the plaza, was not completed until about 1530.

The new city boasted of its wide streets and that it maintained the ancient causeways intact, taking care, however, to widen them. Particular attention was given to the causeway leading to Tlacopan. It was the first to be widened, the openings therein were filled-up,

[1] Continued from No. 911, page 168.

and house-building along its line was encouraged, that a line of defences might be obtained and a retreat might be made in case of necessity, without any such perils as those of the Noche Triste.

At the place of the opening in the ancient causeway that had precipitated the terrible fight of Noche Triste, one of the Spanish

Domed Church, Santiago Tlatelolco, Erected in 1543 and still standing.

survivors of that conflict erected an adobe chapel, which finally gained the name of San Hipolito. It was replaced towards the end of the sixteenth century by a more permanent structure and is now marked by one of the most prominent features of that portion of the City of Mexico.

Among the earliest structures to engage the attention of Cortés were the *atarazanas*, naval arsensals and forts, intended for the defence of the city from the lakeside and also for the preservation of the brigantines used in the siege of the ancient pueblo. There were probably two such structures, one near where now stands the Garita de San Lazaro, the other at Xoloc. The brigantines were preserved more as relics than as available naval defences, for the recession of the waters of the lake speedily began, and Texcoco is now more an enormous marsh than a deep mountain lake. Indeed, the location of one of the *atarazanas* near San Lazaro is an indication of a considerable extension of the island in that direction.

Further public works belonging to this period were the repairs of the ancient aqueduct, partially destroyed during the siege, the building of a hospital for lepers near San Lazaro, and the foundation of the church and hospital of Nuestra Señora de la Purisima Concepcion at Huitzillan.

The building of this city of the Conquistadores occupied four years. Motolinia, the Franciscan chronicler, pictures the scene, probably with general accuracy. He says that in the earlier stages of the work, more workmen were employed than in the building of the Temple at Jerusalem. They were the Tlaxcalan allies of the Spaniards and impressed by them for the work. He frequently refers to the enslaved children of Israel building the pyramids for the Pharaohs, yet writes of the songs never ceasing day nor night when the work was begun, attesting the fervor with which the Tlaxcalan slaves carried it on.

The arrival of the religious orders opened a new architectural epoch in the history of this strange city. The Franciscans, twelve in number, clothed with extraordinary powers from the Pope and the Emperor, arrived in 1524, and set out at once to erect a monastery and suitable places of worship for the natives whom they were to take under their spiritual care. For the erection of the monastery, Cortés provided funds, and allowed the use of hewn stone from the steps of the great *teocalli* to eke out the building material. The site appropriated was that traditionally occupied by the so-called House of Birds and Garden of Wild Beasts in the ancient pueblo. The buildings thus erected included, besides a church for the Franciscans, the chapel of San José de los Naturales, the first parish church of the natives. It is the only building of this period which we may venture to describe. It was designed to meet a peculiar demand and may have been unique among the ecclesiastical structures of the time. It was "a great arcade or shed, its vaulted roof upheld by stone pillars" instead of walls. It was so "constructed that not only might a great number of Indians be assembled under its roof, but that several thousands clustered round it might see and take part in its services." It seems to have had a greater degree of permanence than most of the contemporary structures, for it remained until 1769, and during its existence it was distinguished by cathedral privileges granted to it by Charles V and Philip II; and by the assembly therein of the first council of the Mexican Church. The Franciscan Church and the Chapel of San José formed the nucleus around which a large group of buildings grew up. The colegio de las Niñas was the next structure of the group to be erected in 1548. It marked the corner of the property belonging to the Franciscans.

Preserving the primitive divisions of the pueblo — Moyotlan, Teopan, Aztacalco and Cuepopan or Tlaquechiuhcan — the Franciscans erected a church in each, and conferred upon them the names of the churches, respectively, viz, San Juan Bautista, San Pablo, San Sebastian, and Nuestra Señora de la Asuncion, since called Santa Maria la Redondo. The location of these churches indicates the extension of the island and the bounds of the city far beyond the limits of the ancient pueblo.

Tlatelolco was likewise provided with a church, Santiago, marking the spot where the Indians had longest held out against the Spaniards in the defence of their pueblo. In 1543 this church was replaced by the present "domed church," built by royal order, which may be accepted as a fair specimen of ecclesiastical architecture in the City of Mexico in the middle of the sixteenth century. It shows an advance in the Spanish settlers towards substantial, if not elegant, buildings.

The Dominicans arrived in New Spain in 1526 and erected first a temporary monastery, upon a spot destined to become famous shortly afterwards; and in 1530, their permanent home in the immediate vicinity, replaced by successive buildings until the present century.

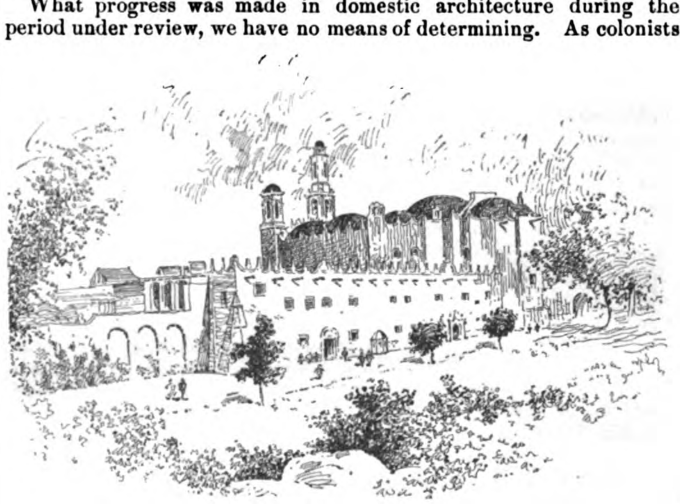
In 1533 the Augustinians arrived and in 1541 expended $162,000 of the public moneys, appropriated to them by royal order, in the erection of their church and monastery. The Jesuits arrived in 1572 and before the end of the century erected several buildings in the northeastern portion of the city.

Without specifying the details of all the ecclesiastical activity of the sixteenth century in the new city, suffice it to say, that about seventeen churches and convents were erected in addition to those already mentioned, in different portions of the city, most of them upon sites still occupied by church edifices, and showing the extension of the original city far beyond the borders of the former island pueblo. The most notable of these were the church and monastery of San Diego, upon what was called the Tianquis or market-place of San Hipolito; the Church of San José el Real; Oratorio de San Felipe Neri, near the centre of the city, its successor being known as the Church of the Profesa, and being one of the most prominent buildings in the city; and the church and convent of Nuestra Señora de la Encarnacion. The monastery of San Diego marked the limits of the city in the west. The grounds about it had but lately been reclaimed from the lake and were still marshy. The Inquisition, which had been established in the City of Mexico in 1571, had built a *quemadero* or *brasero* (burning place for its victims), immediately in front of it. It is more than probable that each of these religious establishments possessed wide gardens in their immediate vicinity, and that the Spanish population was still confined to the *traza*, or had spread but little beyond it. There may have been clusters of native huts around each of the religious establishments.

The Bishopric of Mexico was created in 1527 and in 1545 it was advanced to the dignity of an Archbishopric. About the earlier date, the small church in the *traza* was replaced by a building used as a cathedral or pro-cathedral, and in 1530 the Bishop, Zumarraga, began the erection of an Episcopal residence near by. The name of Zumarraga is associated, however, not so much with construction as with destruction. To him is accredited the destroying of many relics of the former occupants of the Mexican Valley, which would have been invaluable to the archæologist and historian. In 1573 the first stone of the present cathedral was laid, which, however, occupied nearly a century in its erection, without disturbing the pro-cathedral until the new building was ready for the use of worshippers. The new building was not ready to receive its roof until after the close of the sixteenth century.

The sixteenth century was marked by the erection of several humane institutions — the Hospital Real, an insane hospital, and one for lepers, and a foundling asylum; and by the erection of various buildings for educational purposes — the University of Mexico among them.

What progress was made in domestic architecture during the period under review, we have no means of determining. As colonists

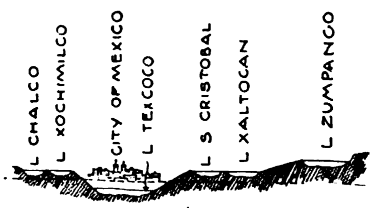


School of Santa Cruz (now Military Prison) and Santiago Tlatelco, Sixteenth-Century Building still standing.

were continually arriving from the Old World we may suppose that ample accommodations were found for such as chose to remain in the capital of the new country. It is estimated that there were 3,000 Spanish families resident in the city at the close of the century. This indicates the existence of a large number of dwelling-houses,

but there are other indications that the houses were not of an imposing character, and whatever architectural beauty there may have been about the city was due to its religious buildings, upon which immense sums of money were being expended.

The Government of the Conquistadores came to an end in 1528 and the city passed into the hands, first of Royal Audiences and then of the Viceroys. Among both the Audiences and the Viceroys were men of progressive ideas who did much for the improvement of the city, but their efforts were crowned with only temporary results owing to two inundations, one in 1552, the other in 1580. Neither of these appears to have had a serious effect upon the ecclesiastical structures, as we find no instances of churches rebuilt. Domestic architecture suffered, however, the houses of the people being less substantially built than the religious houses. These inundations brought the rulers face to face with the great question of hydrostatics. The Mexican Valley comprises several bodies of water, some of them being above the present level of the main plaza in the city, as follows: Zumpango, 5 metres; Xaltocan, 3.5 metres; San Cristobal, 3.35 metres; Chalco and Xochimilco, 3.2 metres; while Texcoco is only 2.11 metres below the level of the plaza. The only definite steps taken to protect the city against this constantly menaced overflow were the dikes of San Lazaro along the eastern borders of the city to keep back the waters of Texcoco. This was but following the example of the Aztecs. It remained for the next century to cope more successfully with this difficult question.



Comparative Elevation of Lakes in the Mexican Valley, in Relation to the City of Mexico.

Towards the end of the century, when the eastern half of the present Alameda was laid out and set apart as a public plaza, the ground in the neighborhood was still low and marshy.

Arthur Howard Noll.

[To be continued.]

MODERN ASYLUMS FOR THE INSANE.[1] — VIII.

SEWERAGE VENTILATION ROADS.

In many asylums a large proportion of the male patients are employed upon the farms, gardens, roads, etc.; the agricultural works executed by them are often of considerable value to the various institutions, whether regarded as a desirable bodily occupation leading to mental improvement, or as a profitable investment of their labor upon the land. Potatoes, cabbages and various vegetables, as well as hay, oats, rye, grain, mangel-würzel, etc., are produced for consumption on the estate, and are often an important consideration, having regard to the exceptional circumstances relating to the value of the labor of the insane patients and matters of a kindred nature. Even the care of dumb creatures, horses, cows, pigs, poultry, etc., is calculated in some instances to foster those habits of thought and consideration for others than self, which shed so salutary an influence over the daily lives of all; with many, sane as well as insane, it is an intense concentration of thought upon self that leads to so much misery; since occupation for mind and body is good for all, whether it brings in a pecuniary return or otherwise. Produce resulting from the works connected with an asylum and its estate can be made highly valuable by reason of the low cost of the patients' labor.

In many asylums sewage-irrigation of the estate is carried on with more or less success. Not less than one acre to each one-hundred-and-fifty patients should be provided, unless the land is very porous and is especially prepared to act as a filter. Irrigation should be with fresh sewage, the volume made each day being passed over some portion of the land and never stored in tanks. An area specially prepared should be provided to act as a sewage-filter for the light outflow of the whole asylum sewage.

Land requires to be specially prepared and worked for effective sewage-irrigation; and should be broken up to a depth of eighteen inches at regular intervals not exceeding two or three years, either by deep or double ploughing, or by spade labor, thus loosening and working the soil and subsoil so as to enable the sewage to become incorporated with the earth. In irrigation there must not be stagnation, either on the surface or among the subsoil. The land should be so laid-out that the "carriers" will distribute the sewage in a thin film over the whole surface, and the subsoil drains should be so deposited that they regularly remove the subsoil water: under such conditions as these the use of special disinfectants should not be necessary.

Porous loamy soil will filter sewage the most perfectly; sand and gravel are quicker in their action; heavy clay will, of course, not filter the sewage at all, but must be specially treated, trenched and prepared for irrigation purposes, then sewage will become purified by flowing over clay land.

Land of a porous character, if closely and deeply drained will filter clarified sewage on a small area, but such land filter should be in duplicate, so that each filter may be at rest and in use alternately. It must be understood that this form of filter will only be required when the area of land under irrigation is small and insufficient for the proper disposal of the asylum sewage. As the earth possesses the power of extracting and absorbing from the sewage the manure it contains, if the dressings are proportionate in volume to the area, to the depth broken up and to the quality of the land, the sewage may be applied to the land throughout the year, containing, as it does, the elements of every field or garden crop which is grown. Compared with other modes of fertilizing, sewage-farming has its advantages.

Some of the works here referred to can be arranged and provided for after the asylum has been opened, and the male patients' labor can then be brought to bear in the execution of much of this preliminary work, as well as for the drainage-system of the estate as distinguished from that of the asylum buildings.

Draining may be defined to be the art of removing from the soil that water which it contains in excess. When the land is surcharged with water, the air is prevented from due access to the pores of the earth, and actions take place in the soil which retard the decomposition of putrescent matters applied to it.

The temperature of soil that is saturated is colder by several degrees in the spring, summer and autumn months than if the ground were dry, and when the saturation takes place in the winter, a portion of the warmer season must elapse before it acquires the temperature favorable to vegetation. The water contained in the soil may either be retained by the particles of the earth in cohesion, or may remain in the pores and interstices unable to make its escape. It is the latter condition that may be supposed to be injurious to the soil and growing plants; the art of the drainer is therefore directed, either to prevent this accumulation of water in the soil, or to remove it by forming for it outlets by which it may pass away.

The water, then, which reaches the soil and cultivated plants may either be that which flows along the surface or that which stagnates upon it, unable to find its way downward.

We are unable to draw a precise line of distinction between the water which saturates the soil from these two causes, but in common language we term the one surface-water and the other underground-water, and to the removal of the one we may apply the term surface-drainage, and to the other underground-drainage. All such works may well be placed in the hands of asylum patients if proper supervision be provided, and here it may be noted that in many asylums there are large numbers of farm and other laborers, bricklayers and persons who, having been engaged in building trades, could be made useful in out-door work on the asylum estates.

All tanks and reservoirs in connection with the drainage-system should be thoroughly well ventilated, and covered with a roof, and it is most highly important to urge the necessity of using the best materials procurable and the most perfect workmanship in connection with the drainage and sewerage works of the asylum; and that the works may be efficient, and remain so, when in use there must be unceasing intelligent care. Sewers, drains and water latrines should be flushed daily, dry earth-closets should be cleansed every day, and in the process of irrigation over the land, care must be taken that the land is not fouled on the surface and is not flooded beyond its powers of absorption, so as to prevent offensive exhalations to the injury and discomfort of the asylum patients and officials.

Pipes of cast-iron are so much stronger and so much more easily laid and maintained that their use for water drainage may be general. In the construction of sewers and water conduits the architect should arrange for occasional cleansing, such arrangements being provided for by man-holes, at which points all sewers or drains should be open, and every drain should, of course, be properly ventilated.

It must be remembered that the above remarks as to drainage bear special reference to the drainage of the estate as apart from the drainage of the buildings, a subject upon which we touched in a former chapter.

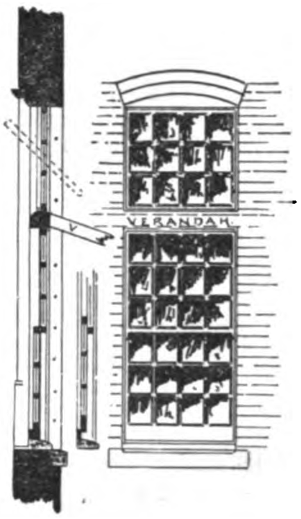
The purification of the air has been generally attempted by what is known as the "upward" system of ventilation, and many arguments against the "downward" system appear to be based upon the results obtained through the defective application of the latter, and the failure to remove the foul air from the room and renew the fresh air in a thoroughly efficient manner with sufficient continuity, as well as the inability to do so without unpleasant draught, which may under certain conditions be considered an evil as disadvantageous as lack of ventilation — the question to a great extent is an open one.

In the annexed figure we give an illustration of an ordinary mode of forming a window which would be suitable especially for "single rooms" and other apartments where a veranda may be placed against the exterior of the walls; by this arrangement a communication with the outer atmosphere may be secured *above* the veranda roof but the sashes below may also be used for purposes of ventilation. On the outside strong iron bars may be fixed where necessary, for preventing the escape of the patients, but in all arrangements great care must be exercised by the architect that the patients shall not be able to use projections, bars, etc., as a means of fixing up a rope, and that they shall not be able privately to

[1] By George H. Bibby, F. R. I. B. A., F. R. Hist. S., and Ernest A. E. Woodrow, A. R. I. B. A. Continued from No. 935, page 99.

abstract the sash-cords as a means of hanging themselves or for escape.

Anything which contributes to the impurity of the air within an asylum, where there is so great a chance, even under the most favorable circumstances, of contamination, ought to be brought within the reach of the best means procurable for its removal. Amongst the impurities of atmosphere may be counted fog, inorganic matter, dust, micro-organisms, carbonic-acid, excessive moisture, excessive dryness, draughts, etc.



Means have been devised for cleansing the internal atmosphere of fog as well as of the accumulations of germs and impurities which accompany it, but it has been found most difficult, if not indeed impossible, to remove from the air, under all circumstances, inorganic matter in the form of smut and dust particles when it is remembered that a cubic inch of city atmosphere has been found to contain 7,000,000 of these dust particles, while air tested near the top of a mountain of great altitude contains 4,000 minute particles of dust to each cubic inch: we must not expect too much in the way of purification of the air in this direction in an asylum; we cannot pretend to enter here into so large a question, which indeed is outside the scope of these papers, as the extent of the danger that may be apprehended from the presence of large quantities of bacteria in the air we breathe. But with regard to carbonic-acid gas the proposition has been laid down as follows: "That whereas the quantity of carbonic-acid is usually taken as a measure of the total impurities of the air vitiated by breathing, *it is highly improbable that an increase in carbonic-acid and a slight diminution in oxygen would materially affect the death-rate:* but that the presence of organic matter and micro-organisms in the air are in all probability far more important factors."

The excess of moisture in the atmosphere during warm weather, produces languor and lassitude, both of *mind* and body, which should be prevented where possible among the inmates of a lunatic asylum, especially as artificial means can be adopted to obviate this by proper ventilating arrangements. On the other hand, when in frosty winter weather the air becomes very dry and unpleasant for respiration, means should be devised for not only warming the air, but also for a certain and well-controlled supply of moisture, bearing always in mind that whatever system or apparatus for ventilation is used a complete absence of draught is essential.

Analysts have supplied us with ample means for correctly ascertaining the condition of the air within our buildings and we cannot appreciate their work at too high a value; it has been rightly suggested that analysts ought to be more frequently engaged in making analyses of the air in public buildings; it is equally needful that they should regularly perform the same in connection with the air breathed by the patients in lunatic asylums, at all periods of the year, and periodically report the results. Architects would then have reliable data to work upon and the asylum officers be armed with a foreknowledge of how to avoid the spread of infectious disease.

In adopting a means of *artificial* ventilation, the patients must not be disturbed by any sound of the slightest pulsatory motion of the air, nor of any noise by reason of the use of any mechanical appliance or fan; the system should be easy to maintain by day and by night, and be efficient in procuring a perfectly equable temperature at all times, under all varying conditions and atmospheric changes. The source of supply of fresh air must of course come from a quarter where there is no contamination whatever, and the whole of the air supplied must be heated or tempered in a manner so as not to interfere with the volume supplied, and it should not be dependent upon the condition or temperature of the atmosphere, whether the wind blow or the air be still, the supply should be maintained equally and in a known and defined quantity.

Whatever may be advanced for or against open fireplaces in lunatic asylums, it must be borne in mind that although they afford ventilation to a certain extent, yet if there are no open fireplaces the unpleasantness of carrying coal and removing ashes is avoided, and thereby a great saving of labor is acquired; there is also not the noise that usually accompanies the poking and renewing of fires, and the uneven temperature created by fires either newly lighted, just made up, burning brightly or burning low, is totally avoided; there is also the additional advantage where open fireplaces are not used, that pokers, tongs and shovels are not needed and are, therefore, not occasionally forgotten by the nurses and attendants, and so cannot fall into the hands of homicidal or suicidal patients. The danger of open fireplaces is obviously a subject for consideration, yet where such fireplaces are provided a certain class of patients seem to take a particular interest in their comfortable and homelike appearance, an item not to be overlooked, although so trivial in providing for the recovery of the sufferers — this item, however, is, perhaps wrongly, more valued by the English than any other people.

We have enumerated several outdoor occupations which the architect may leave for the employment of the patients; there is yet another which may come under the supervision of the asylum architect or engineer — that is road-making. These officials have to arrange and provide for the several roads within the estate of the asylum, as well as, at times, for the approaches thereto. This involves a large expenditure, especially when the asylum is located in a district where labor and materials are scarce or unsuitable.

Some of the roads require to be laid in a most substantial manner, and this will be admitted when we consider how many thousands of tons of coal, provisions and materials, compelling traffic of a heavy nature, must pass to and from an asylum of even moderate dimensions. Some of the roads must be formed before the building of the asylum is commenced, to enable heavy masses of stone, bricks and building-materials to be brought to the site with due economy, unless indeed a branch railway be laid directly up to and onto the asylum site in connection with the nearest public railroad. This course has frequently been found the most economical, and contractors in England have often found it worth their while when executing such work to lay a line of rails of considerable length at their own cost, in order to save the cartage.

There are some authorities who are of opinion that it is better for a roadway to be undulating than level, it being contended that the horses are eased by the change of position of the harness and load, and that they are thereby less fatigued on a road with slight ascents and descents than on one that is of a dead level. There may be some foundation for the theory that a horse finds relief by having his harness and line of traction varied, but there can be no reason for asserting that an undulating road is preferable to a level one as a means of diminishing the expenditure of muscular power. It is quite true that level roads are sometimes more difficult for horses than undulating ground, especially on low levels, but this is not because the road is more level, but because it is generally more soft and wet, and so productive of greater friction than when on higher and firmer ground. There is no more exhaustive road than a sandy plain, but this is not because it is level, but because it is sandy and soft. Coachmen and others who extol the advantages of undulating roads do not, it may be believed, reason very deeply on the matter and wrongly ascribe to the beasts the satisfaction they themselves experience from a change of position, while the horses probably feel no other gratification than that which temporarily arises from the diminution of their burden on descending an incline.

Roads to asylums, both within the estate and without from the neighboring towns, should be as level as circumstances will admit and should be made with a hard and smooth surface, so as to resist the pressure of heavy loads.

Excavating and embanking are the means which of course must be resorted to for obviating the inequalities of level in the natural surfaces, the earth taken from the excavations being employed for the embankments. The removal of large masses of earth or rock is at all times an expensive process, but even in the formation for ordinary roadways it is too generally neglected; this when it arises from insufficiency of funds is to be regretted, but the first expense of the formation of a road is but small in proportion to the permanent loss of power from imperfect construction and cost of repair. There is no doubt that error in a great many cases arises through undervaluing the importance of level roadways and the effects of ascent and descent on the force of traction. The roads should be as straight as possible, and if made curved or winding to avoid inequalities of levels, the curves should not be sharp or sudden.

Many of the roads leading from the entrance-lodges of asylums to the main buildings are very beautifully planted with shrubs and trees of various descriptions, with borders of grass and flowers and frequently suggest the approach to the residences of the highest grades of society, passing as these roads do through magnificently wooded parks and scenery of extreme beauty.

It is not now usual to enclose the whole of the land attached to an asylum with high walls or specially unclimbable fencing, but this is absolutely necessary for the airing-courts near the main asylum, where the various classes of patients are divided and subdivided for the purposes of exercise, but to the airing-courts the fencing should be open ironwork, about twelve feet in height, so that the prison-like idea of high walls shall not exist. The airing-courts may include tennis-courts, etc. and be planted with shrubs and flowers, but trees and large shrubs must not be allowed to afford patients opportunities for hiding, escape or mischief; the whole area should be freely in view of the attendants and nurses.

[To be continued.]

ON THE PRINCIPLES FOR LAYING-OUT CITIES.[1]

THE building-plan of a city in the wider sense, or the street-plan in the narrower sense, ought not merely to satisfy the practical requirements of the traffic, of the building and of health; it ought also to be laid out on æsthetic principles, *i. e.*, in such wise that it may give an impression of beauty in all its parts, or, what is

[1] Portion of a paper prepared for the International Engineering Congress of the World's Columbian Exposition by Herr J. Steuben, Baurath and assistant Burgomaster of Cologne.

the same thing, may awake in the beholder a disinterested satisfaction. As the fostering of beauty in all arts is the most eminent problem, so the beauty of the outward appearance in the art of building cities is of superlative importance. The art of city-building, which the city population everywhere comes in contact with, is more than any other branch of art-practice an art for the people. If, with the cultivation of beauty, the associated influence of heart and soul be aimed at, we may anticipate from the æsthetic perfection of the building plan of a city, a rich and blessed influence upon the stratum of city population inclined to rudeness. At the same time, however, as well for the cultivated as for susceptible minds in general, it is a spring of pleasures and enjoyments. The considerations of the beautiful relate to the perfecting of the streets and squares in themselves, and to their relation to the buildings.

a. The Perfecting of the Streets and Squares. — The streets should not be too long. Too great length of street wearies the eye, wearies the spirit and awakens a feeling of discomfort. The danger of this unpleasant sensation begins as soon as the length of the straight streets exceeds twenty or thirty times their width. Should, however, a change of direction be undesirable for practical reasons, there remains the remedy against the tiresome effect of subjecting the street to variations in its width and cross-section.

For the regulation of streets, straight lines ought not to be exclusively employed. Gentle curves which conform to superficial outlines or to natural boundaries may produce fine effects in the form of the streets. It is not necessary that the two sides of a thoroughfare should be always exactly parallel; a pleasant effect may follow, from the irregular widths of streets, at the opening of squares, a junction with older parts of the city, or natural obstacles of ground. The bow-shaped avenue is preferable to the polygonal form, or strictly, a bow-like polygon of which single parts answer to the widths of the houses.

A street ought not to be conducted in straight lines over a summit; that is, convex changes of grade are to be avoided. The reason of the unbeautiful appearance of this sort of convex street lies in the apparent sinking of the buildings, wagons and people beyond the ridge of the street. Passing over a high point has to be accomplished by a bending of the street in plan and profile, the course of which the eye cannot follow beyond the ridge, or by means of breaking off the street at the summit. The interruption may be a vertical or a horizontal one; a vertical in the form of a monument, a plantation, a fountain, or the like which the eye cannot see beyond; a horizontal in the form of a crossing or dispersing place beyond which the direction of the street changes.

If the convex street is unhandsome, the concave profile creates on the contrary a special advantage. It affords to the street surface by day and by night a pleasing spectacle and may produce with artificial lights magnificent results.

The street surface ought not to be too wide, because the void does not satisfy the eye or the mind. If the street surface cannot or should not be beautified with rows of trees and garden-plots, a width is to be preferred restricted to traffic and health.

All portions of the street surface unnecessary to traffic are to be set-out with ornamental plants or artificial ornaments. Rows of trees and garden spaces have been already mentioned. Artificial ornaments consist not merely in monuments, graceful statues, water-jets, flowing fountains, gate structures, arcades and other works of architecture and sculptural art, but also in the tasteful and well-modelled improvements of requisite utility upon the streets, such as trading-stalls, waiting-rooms for street-railways, places of convenience, columns for posters, fire-announcers, drinking-stands, lamp-posts, candelabra, lanterns, street-signs, warning-boards, boxes for sweepings, enclosures and tree-boxes. To the artistic sense and artistic gift of form, pleasure is given by all these (for the most part subordinate) objects and thus they come to contribute to the pleasing and agreeable appearance of the street scene.

Finally, it is important in the improvement of the streets to provide for frequent change. This change should relate to street widths, the widths and arrangement of driveways and walks, the number and position of rows of trees, the artistic ornament, the garden surfaces in the streets and front-yards, the kind of house-buildings (closed or open, high or low buildings). Every street, or at least every prominent street, should be handled and improved for itself individually, so that it may afford a characteristic appearance. The wearisome and unhandsome uniformity under which so many modern streets suffer may be in this manner effectively avoided.

All the foregoing remarks upon perfecting the streets apply in greater measure to the public squares. They should not be too large, nor built exclusively on straight lines, nor have any summits; they should utilize the advantage of concave surfaces; they should be adorned with trees set out, with garden-plots and artistic ornaments, so far as the traffic and the considerations in the following paragraph permit it to be done; and they should present an individual variety in their setting-out.

The traffic squares decidedly require openings on all sides; their free surfaces serve the walking and driving travel. All other squares need a close-built frame of surroundings, because it is through this frame that the square is formed in an architectural sense; the wagon travel may be permitted around the border of the parks, but not across the open spaces of such squares.

b. The Relation of Streets and Squares to the Buildings. — The streets of the city are not merely for the purpose of serving the traffic, giving an opportunity for the improvement of real estate, and by their air-spaces, plantations and accessories proving useful and beautiful, but they are also destined to bring our structures into agreeable position and effective grouping. The latter applies in an especial manner to monumental works of architecture and sculpture.

According to æsthetic laws, there are four different distances to be distinguished for viewing buildings and statues, viz., a distance equal to the approximate height of the work, which is specially suitable for observing the details of a structure; a distance equal to double the height, to view the whole work as a picture by itself; a distance equal to three times the height, in which the work, united with its surroundings, makes a part of the joint architectural idea, and a fourfold and greater distance, which only shows the grouping of masses and development of outlines, producing picturesque views of the city.

From which it follows, if a monumental edifice is to be erected within the ordinary street-lines, the width of the street should not be less in any case than the height of the contemplated structure; but it is better to bring the street to one and a half or twice the measure. Should the latter be impracticable for the whole length of the street, the widening should occur directly in front of the structure, by placing the structure back behind the street-line, in order to obtain front space and thus a distance of sight. Instead of setting back the structure, the corresponding place on the opposite side of the street can be set back, so that the open space is obtained on the other side of the street. In curved streets the concave side, to which the sight is always directed, is chosen for erecting monumental buildings, because more suitable than the more hidden convex side of the street.

But the appearance of a structure is more effective if in the original establishment, or the later completion of the plan of the city, the street-system is so laid out that a monumental work forms the objective point (closing point) of a street, or of several streets; and furthermore, an elevated locality is assigned to such buildings. The axial and elevated erection of monumental buildings enriches and beautifies the appearance of the city, and serves at the same time a practical purpose, as it makes it easy to direct one's way in the network of streets.

We should beware of too frequently occurring faults in the axial arrangement of streets and monuments, namely, of exaggerating the distance of view, and of obstructing the traffic. According to the aforementioned æsthetic principles, the monument already begins to lose its architectural effectiveness at a distance of four times its height; there remains only the effect of picturesque masses and outlines. But these, too, lose their signification if by a very great increase of vista the scale of objects is too much reduced. Statues are, on this account, particularly unsuited to street intersections, and architectural works, as a rule, should not stand free to view at a greater distance than such as corresponds to ten times the height. Also, a monument ought not to be of the kind to interrupt a line of traffic which would be compelled to go around the structure, in order to set forward again on the farther side in the same direction as before. The monument should rather occupy the effective street termination at which a natural turning aside or separation of traffic occurs.

Still more than the shaping of streets does the improvement of public squares stand mutually related in artistic effect to buildings and monuments erected on or near the squares. The destination of squares as traffic areas, as air reservoirs, and as shaded places of recreation stands subordinate to the question how they may serve as a place of setting up the more important works of architecture and monumental art. The erection follows so that the buildings and monuments take up a position either upon the area of the square, or they surround the square, or both kinds of erection are combined.

If the square is built up with a structure standing free all around, a space must be left open in front of the building at least of such width that it may serve as a plaza so as to offer the sufficient distance for observation. Here especially a distance equal to double the height is of importance. The other parts of the square have then merely a nearly neutral significance.

Instead of one front space, two or more are often arranged, in order — besides the front view — to bring into proper effect some other important aspects of the monument. With monuments of great extent this arrangement, which results in the division of the entire square into a group of squares, is specially judicious. In this connection care should be taken to secure the aspect of being in a closed frame to each one of the partial squares.

In a similar manner, too, should sculptured monuments, if they occupy a public square as a masterpiece, be so placed that the larger portion of the area should extend in front of the statue for its better observation, while the other parts of the square have a more restricted significance. The exceptions are such purely architectural monuments as columns, obelisks, fountains, etc., which are equally important on all sides. These may occupy the middle point of a square. Another kind of arrangement is adapted to an elongated place. It consists of a row of figures or monuments occupying the longitudinal axis, so that a masterpiece may adorn the middle point.

If the place is surrounded with several buildings, and has an open area, there arises the most distinguished creation of city construction. The most careful weighing of proportions is here especially important, in order to obtain the appropriate distances of observation. High structures come to stand at the ends, and low ones along

the sides, of a place. A space of view of double the height is essential to comprehend the form of an edifice; a threefold distance is necessary, in order to enjoy a general view of a group of buildings. It does not require symmetry in a geometrical sense; but the buildings should so surround the place that an artistic balance may everywhere prevail, that the enclosure may appear complete, and that the outgoing streets may not break up the design unfavorably. In many cases the breaks may be abolished or avoided by portals built over the street exits.

Also statuesque figures standing along the sides are suitable to complete and embellish the surroundings of the place. To every work can the just distance of view be thus afforded, while it contributes in general form to the artistic effect of the whole.

The combination plan of building upon and around the parts of a square is truly difficult, but still is accompanied by the loveliest artistic effects, if it fulfils the æsthetic considerations which govern the erection of building and monumental work in the various positions. It requires great exercise of a well-developed artistic feeling to strike the right thing. This feeling alone decides in a so-called picturesque, that is, irregular, laying-out of a place and free groupings. These often occur, too, in modern, practically managed city plans where it depends upon bringing into harmony historical structures with new creations.

ABSTRACT. — I. PRACTICAL PRINCIPLES.

a. The city traffic demands the laying-out of radial, ring, diagonal and by-streets, as well as business squares and focal points. A mere rectangular system is unfit for a street-plan.

The laying-out of street-railways is to be regarded. The profile of the streets should be the flattest possible, but drained, the embankment not to be too high. Excavations are to be practically avoided. The width and cross-section of streets should answer generously to the amount and kind of traffic.

Also for traffic not done on the streets (railroad and water-way traffic) the lay-out of the city must have a care.

b. The blocks formed by the network of business streets are suitable for city construction. Sharp-angled corners are to be rounded off.

Within the blocks the property lines are to be swung into rectangular position by either voluntary exchange or legal compulsion.

The lay-out of the city has to provide blocks of different sizes in suitable places, such as are requisite for business operations, private houses, rented houses, stores and workmen's dwellings.

Also, blocks and parts of blocks are to be provided in suitable size and place for erecting public buildings.

c. For reasons of health, the city ground must be free from overflow, or protected; the soil must be kept dry and clean.

An underground system of sewers is indispensable to the removing of atmospheric precipitates, the domestic and industrial waste-water and human excreta.

General provision of good drinking-water is necessary.

A sufficient provision of atmospheric light and of direct sunlight is to be provided by a judicious orientation of the streets towards the cardinal points and a generous width of the streets; but, better still, by a rational arrangement of the habitations within the blocks. For night-lighting the electric-light is preferable to gas.

The providing of the city with fresh air requires, besides sufficient width of streets and size of yards, open squares in the street-system and gardens in the building blocks, further, such districts as will allow only separate buildings to be erected; and, finally, shade-trees on the streets, squares and separate parks. The plantations, consisting of rows of trees and garden levels, serve not merely to purify the air, but cause the city population to take bodily exercise, and afford recreation and refreshment.

The city lay-out has to provide special districts for industries injurious to health or annoying, and has to lay down local restrictions.

II. ÆSTHETIC PRINCIPLES.

a. The elegant development of the streets requires the restriction of street-lengths, the variation of straight and curved street-lines, the avoidance of convex and the preferring of concave changes of grade, the avoidance of street-spaces all too wide and vacant, the setting-out of the streets with horticultural and artistic decorations, and, furthermore, the individual handling of single streets, but not in a pattern-like way.

For the elegant development of places the same points-of-view are to be regarded. Convex shape of ground and excessive size of vacant levels are to be avoided; individuality of formation to be aimed at, and, so far as the design permits, a close-built frame of surroundings to be provided and the open spaces to be kept free from carriage-roads across them.

b. For obtaining an elegant proportion between the streets and places on the one hand and the buildings on the other, the following rules are useful: Choice of street-widths not narrower than the height of buildings; arrangements of spaces in front of important structures; preference of the concave side of streets; putting prominent structures in an elevated position and at the objective point of one or more streets, while avoiding, however, the embarrassment of traffic and exaggerated visual distances; furthermore, placing a structure upon an open square, so that a front space, or several parts of a square, suitably enclosed and of sufficient size, may be kept free for observation of the structure; placing one or more monumental buildings on or around an open place, so that suitable visual distance is everywhere afforded, an artistic equilibrium produced, the enclosure of the picture made complete and its disintegration avoided.

Monuments of figurative art are not to stand at the middle point of a square; this is permissible only for all-round homogeneous works of architectural art. Arranging them in rows on the longitudinal axis is seldom judicious, while standing them around the border is frequently so, and the bringing about of a correct distance for observation is necessary.

For the irregular arrangements of a picturesque kind, there is no other rule than artistic feeling.

THE CHATEAU DE RAMEZAY, QUEBEC.

THE attention of Canadians interested in historical subjects has been aroused lately by the step taken by the Quebec Government in selling at public auction the old historic Château de Ramezay, one of the last surviving relics of the French regime in Montreal. The Government was driven to this step in order to secure money for its depleted treasury, and to dispose of property which brought in no revenue. The announcement that the old building was to be sold, and probably demolished, awakened the activity of the Antiquarian and Numismatic Society, and the members set actively to work, to save the building. After an active propaganda among the citizens generally, the Society succeeded in inducing the civic authorities to secure the old relic, and it is now to be converted into a museum of Canadian relics.

The château stands on Notre Dame Street, opposite the City-hall, and, having been built in the earliest times of the settlement, is naturally a primitive-looking building. It was built substantially, however, and has withstood the action of time remarkably well. It is well preserved in every respect, and looks to be good for another century. It is of one story, with a mansard, and is surrounded by a garden inclosed with a railing. The interesting part of the building is that contained underground.

The building is divided into various halls and rooms, and the walls bear traces of their having been built by a bygone generation. The roof, which was particularly well-built, has sheltered Benjamin Franklin, Carrolls of Carrollton, Brigadier-General Wooster, Mr. Chase, besides many illustrious men belonging to France, England and Canada. It has been the headquarters of these three countries in Canada at various periods. It was built about the year 1704 by Claude de Ramezay, Seigneur of La Cesse, Boisfleurent and Monnoir, Knight of the Military Order of St. Louis, who had formerly been Governor of Three Rivers, and was later on appointed Governor of Montreal. M. de Ramezay was the father of J. Bte. Nicolas Roch de Ramezay, who signed the capitulation of Quebec. The château was visited by Charlevoix in 1721. After the death of M. de Ramezay in 1724, the château remained in possession of his heirs until 1745, when they sold it to the "Compagnie des Indes," by whom it was made the principal post for their fur traffic with the Indians. After the capitulation of Montreal, in 1760, the building was purchased by Mr. Grant, and later on by the Government, prior to April, 1762. After the conquest it was chosen as the official residence of the Governors. During the American invasion of 1775 it was occupied by the American Brigadier-General Wooster, and in 1776 by his successor, Benedict Arnold, who held a council there with Benjamin Franklin, the two Carrolls and Mr. Chase.

About the year 1784 the château was repaired by the Baron St. Leger, who made it his residence for some time, and afterward it was occasionally occupied by the Governors who visited Montreal. During the existence of the Special Council in Montreal, from 1837 to 1841, and after the city became the permanent seat of Government, from 1843 to the fall of 1849, the château and adjacent buildings were used for the officers of the Executive. From the end of 1849 till the winter of 1856 it was used as a Court-house and Registrar's office.

From the end of 1856 until 1868 the château proper was occupied as the headquarters of the Superintendent of Education for Lower Canada, and in 1868 it was handed over for the use of the Jacques Cartier Normal School. When the Normal School moved into the new building on Logan's farm, the château became the headquarters of the Montreal branch of the Laval University, and remained so until the creation of the Magistrates' Court, which occupied it during the whole time of its existence jointly with the Circuit Court, whose sittings still take place there. As familiar as the public is with the general appearance of the old château and its surroundings, very few among the present generation have had an opportunity to visit its interesting vaults and subterranean corridors. On entering these sombre recesses one fancies himself to be within the walls of some mediæval castle. The arched ceilings, the dim light coming from the side windows, the solidity of the walls and the huge door leading into the dungeons fill the mind with awe. The underground construction of the building fully justifies its appellation of "château," as will be readily seen on inspecting the wine cellar and the iron door to the dungeons.

The château was the scene of a sensational incident in the exciting days of 1849, when the Parliament Buildings in this city were destroyed by a mob of Britishers who objected to the passing of the Rebellion Losses bill. As Lord Elgin drove along St. James Street

to give the royal sanction to the bill he was pelted with stones and rotten eggs by the Tories, and he sought refuge in the Château de Ramezay. As soon as his Excellency had entered the building the crowd tried to follow him, but young Coursal, who later became the member of Parliament for this city, and other French Canadians barred the entrance. It was only under a powerful escort that the English representative could make his way out of the place.

The Government intends to contribute to the museum, and promises have been received of contributions from various foreign countries. Prince Roland Bonaparte has already made a valuable contribution. — *N. Y. Times.*

AN APPLICATION OF THE NEW INSURANCE SCHEDULE.

UNIVERSAL Mercantile Schedule Rate on the new fireproof office building of the Continental Insurance Company, 44, 46 and 48 Cedar Street, New York City.

Key-rate of City, $26\frac{5}{10}$ cents.

Deficiences: 288, part stone front, 1 cent; 295 and 296, height, 7 cents; 299, elevator and staircase, 1 cent; 311, narrow street, 6 cents; 314, lighted with electricity, 1 cent; total, $42\frac{5}{10}$ cents.

Deductions; 314, 342, 345, 348, 31%; also 184 and 185, 25%.

Exposure charge, 2 cents. Total, 24 cents, for insurance to the extent of 15% of the value.

For 50% insurance, the rate would be 11.92; for 60%, 10.44; 70%, 9.24; 80%, 8½ cents, or 33 cents for five years.

The building is constructed throughout on the most approved fireproof principles. The upright or vertical supports, story-posts and columns are of cast-iron, with the beam-bearing brackets cast in one piece with the shaft, no rivets. This use of cast-iron for the uprights instead of wrought-iron or rivet construction is an important feature, as the latter would be certain to rust, especially when covered up, as the law requires, by fireproofing material, where rusting could not be detected and might result in the wreck of a building without warning. The side walls are four inches thicker on each story than the building law of New York requires. The elevators and staircases are cut off by fire-walls in a separate shaft. The lighting is by electricity, all the wires being protected in patent brass-tubing lined with hard-rubber insulation. No building in the country has a safer system of electric-lighting, wiring and insulation.

SOCIETIES

BROOKLYN INSTITUTE OF ARCHITECTS.

THE first annual meeting of the Advisory Board of the Department of Architecture of the Brooklyn Institute was held on the 10th ult., at the home of Prof. F. W. Hooper. The paper read and discussed was "The Influence of our Life on Architecture" by Mr. Thomas Hastings, architect. It was a carefully-prepared argument. The Department has these meetings monthly, held at the houses of the members, and they are exceedingly instructive and genial.

ILLUSTRATIONS

[*Contributors of drawings are requested to send also plans and a full and adequate description of the buildings, including a statement of cost.*]

ENTRANCE TO THE CINGALESE BUILDING, WORLD'S COLUMBIAN EXHIBITION, CHICAGO, ILL.

[Gelatine Print issued with the International and Imperial Editions only.]

HEAD-HOUSE FOR THE PUBLIC BATH SYSTEM, MARINE PARK, SOUTH BOSTON, MASS. MR. EDMUND M. WHEELWRIGHT, CITY ARCHITECT, BOSTON, MASS.

NEW ORGAN-FRONTS FOR ST. LUKE'S CHURCH, GERMANTOWN, PA. MR. GEORGE T. PEARSON, ARCHITECT, PHILADELPHIA, PA.

PROPOSED BUILDING FOR THE LITHGOW LIBRARY, AUGUSTA, ME. MR. W. S. ALDRICH, ARCHITECT, SOMERVILLE, MASS.

BRADLEY MEMORIAL CHAPEL AND GATE-LODGE, FORT HILL CEMETERY, AUBURN, N. Y. MR. J. A. SCHWEINFURTH, ARCHITECT, BOSTON, MASS.

[Additional Illustrations in the International Edition.]

FRONT VIEW OF THE STAIRCASE IN THE COURT OF HONOR OF THE OLD HOTEL DE VILLE, PARIS, FRANCE.

[Copper-plate Photogravure.]

DOES any one remember the staircase in the Cour d'Honneur of the Old Hôtel de Ville at Paris, that building which has been one of the chief victims of the various social revolutions? Formerly it enjoyed a reputation which the inspection of these illustrations will prove was thoroughly deserved, although the details were, perhaps, a little too rich and somewhat out of character with the architectonic sobriety of the court-yard itself with its sumptuous ordonnance. But what a pretty little structure it is, taken by itself, and how all the curvatures of its construction everywhere give the most enticing perspectives! The fountain arranged in the middle and below the double revolution of that staircase itself added to the *ensemble* a note of richness and originality which is almost unique in the annals of architecture. There are many still living who remember the luxurious fêtes of Baron Haussmann and the marvellous decorative effects obtained by colored-lights playing over the waters of this curious fountain. Clearly the ordonnance of these colonnettes, with their tormented forms which support the strings of the stairs is subject to criticism, for here lies the chief fault of this charming work, which would have gained considerably if one could have seen simplified all these details which savor something of the faded belle. However this may be, one must bitterly regret the destruction of this fine and charming piece of work, which it was not thought fit to preserve at the time of the restoration of the whole building.

SIDE VIEW OF THE SAME.

[Copper-plate Photogravure.]

THE DRAWING-ROOM, IMPNEY, DROITWICH, ENG. MESSRS. J. TRONQUOIS AND R. PHENÉ SPIERS, ARCHITECTS.

THE REREDOS, GLASGOW CATHEDRAL, SCOTLAND. MR. JOHN HONEYMAN, ARCHITECT.

THE HOTEL DE VILLE, PRAGUE, BOHEMIA, AFTER A DRAWING BY SAMUEL PROUT.

NOTES AND CLIPPINGS

A TREATMENT OF SEWAGE BY ELECTRICITY. — The system of electrical sanitation which M. Hermite tried with striking results in Rouen in 1889, has been adopted upon a large scale in Le Havre. A correspondent of the London *Standard* in the latter city writes: "This system is based upon the electrolysis of sea-water. The electric current decomposes the chloride of magnesium, while the chloride of sodium serves as a conductor. The result is a liquid disinfectant of great power. It is almost odorless, leaves no residuum when used for purposes of flushing, and is perfectly inoffensive. The solid matter in sewage is instantaneously consumed in this solution, as well as all organic matter. What is left is simply an odorless and troubled liquid, incapable of fermentation, and containing only a few phosphates, the salts of ammonia and the salts of the disinfectant. There are two classes of microbes — anaërobic organisms, which exist without air, and aerobic organisms, requiring air to live. On the first the action of this chloride compound is simple. As their name indicates, they cannot live in the presence of oxygen. Their extinction, therefore, is swift and sure. The destruction of the microbes which require free oxygen to support life is equally certain. They are consumed instantaneously by the corrosive action of the gas. At Le Havre, H. Hermite has found the opportunity for which he has long been waiting. There is sea-water in abundance, and an enterprising municipality. A central station has been constructed, supplied with the necessary electric plant and convenient tanks, in which the disinfectant is prepared in sufficient quantities. By a simple arrangement of pipes and ducts this is distributed through the streets like water or gas. It can also be laid-on to the houses, which, when once supplied with the disinfectant, help to purify the main drain, instead of adding, as is now the case, to the general contamination. — *N. Y. Evening Post.*

THE FRESCOES IN THE MANCHESTER TOWN-HALL. — The late Ford Madox Brown, last or next to last of the original Pre-Raphaelites, had much to bear from critics who did not at all admire his frescoes in the town-hall of Manchester, England. Now that he is dead, bad luck pursues these questionable works of arts. Cracks have appeared, the descriptive cards have soiled the pictures in spots, vandals have chipped them with umbrellas, and the charwomen have rubbed their dusters over the paint while cleaning the stonework. To many Britons these frescoes give great pleasure, and the Chairman of the Committee on Art belonging to the Royal Manchester Institution has memorialized the Mayor to save them from ruin. He thinks that people will come some day to Manchester expressly to see the frescoes of Ford Madox Brown, and will curse the generation that allowed such works of art to be defaced. — *N. Y. Times.*

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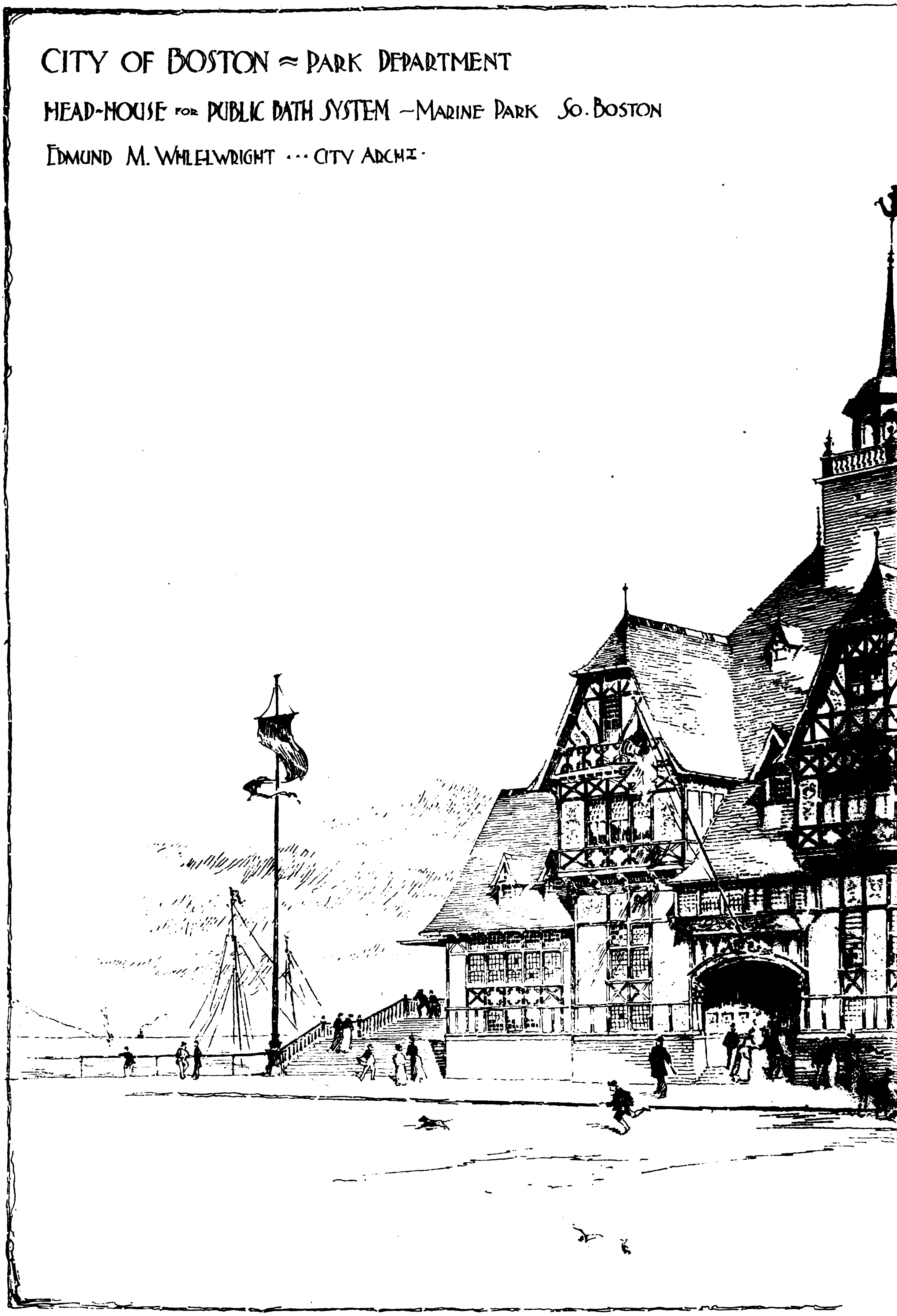
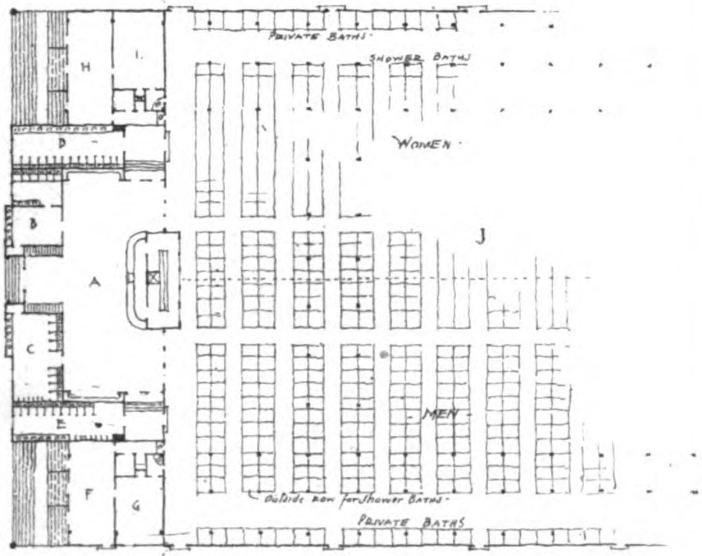
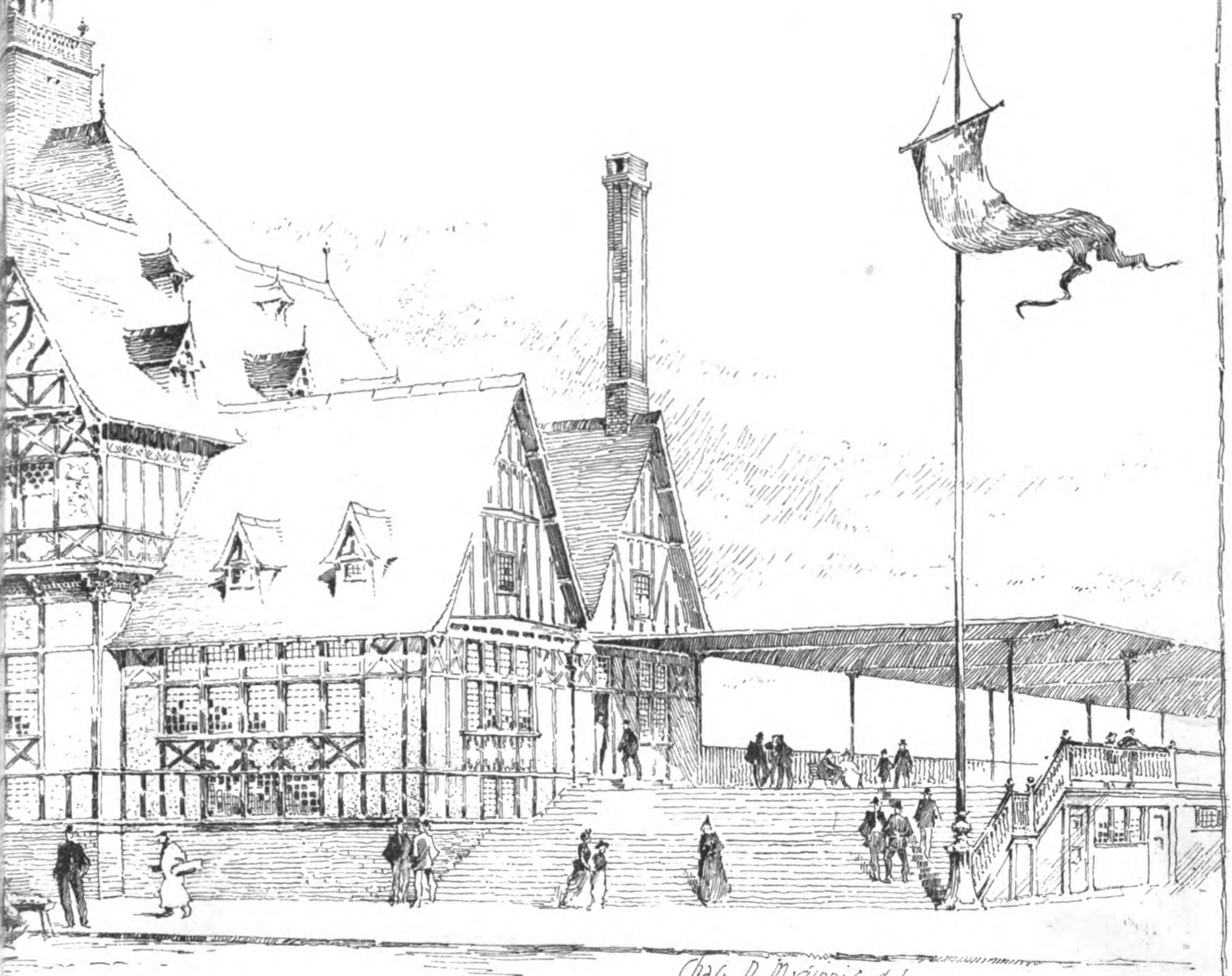

CITY OF BOSTON ≈ PARK DEPARTMENT
HEAD-HOUSE FOR PUBLIC BATH SYSTEM —MARINE PARK SO. BOSTON
EDMUND M. WHEELWRIGHT ··· CITY ARCHT·



A – GENERAL WAITING ROOM. B – WOMEN'S WAITING ROOM
C – MEN'S TOILET D – WOMEN'S BATH TOILET. E – MEN'S BATH TOILET
F – WORKMEN'S RM. G. – FOREMAN'S RM. H – POLICE ROOM.
I – SERGEANT'S ROOM. . J – BATH-HOUSES.

Shower Baths		98	1171
Private	"	74	
Public	"	999	

RESTAURANTS OVER TOILET ROOMS –



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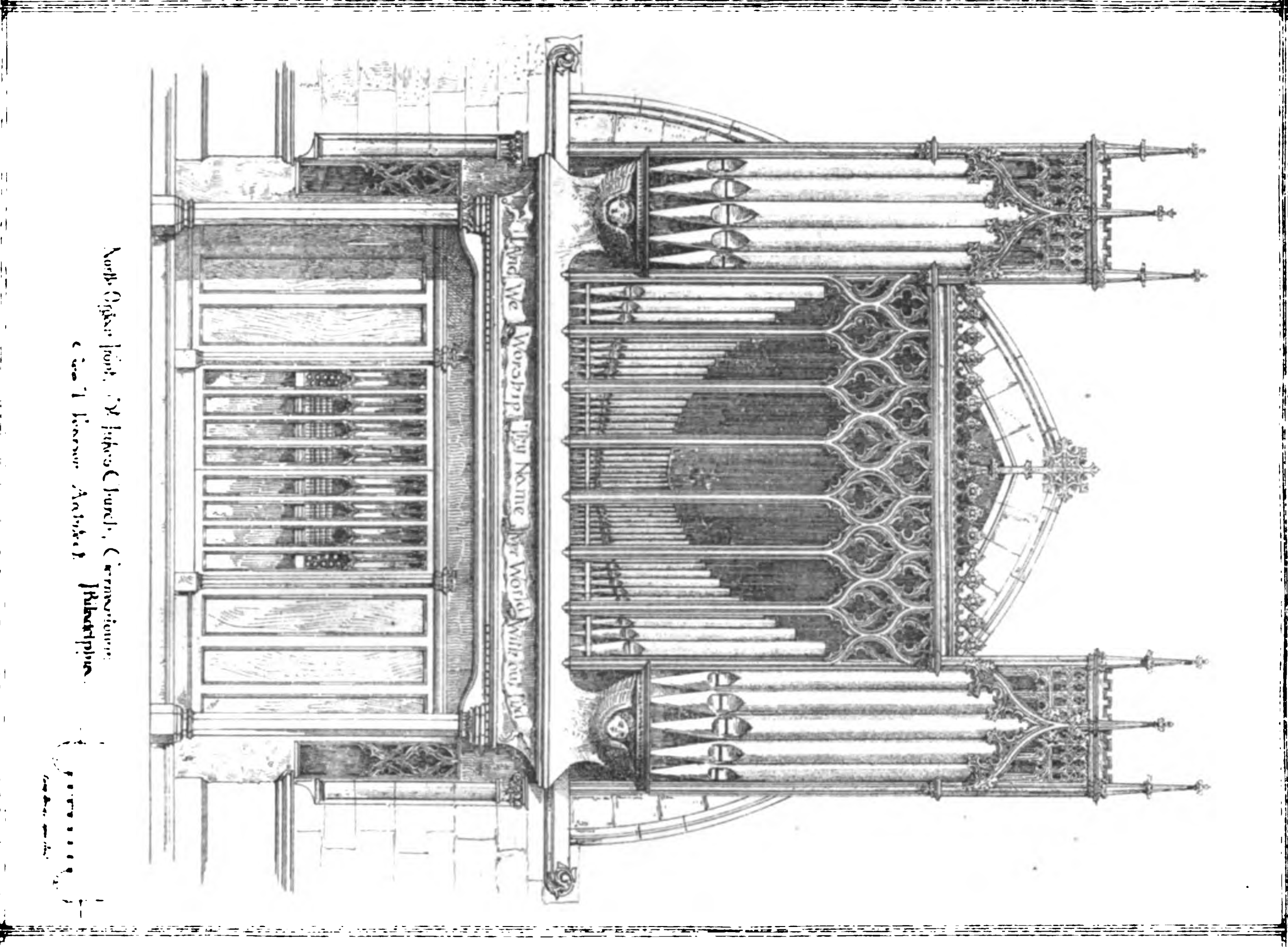

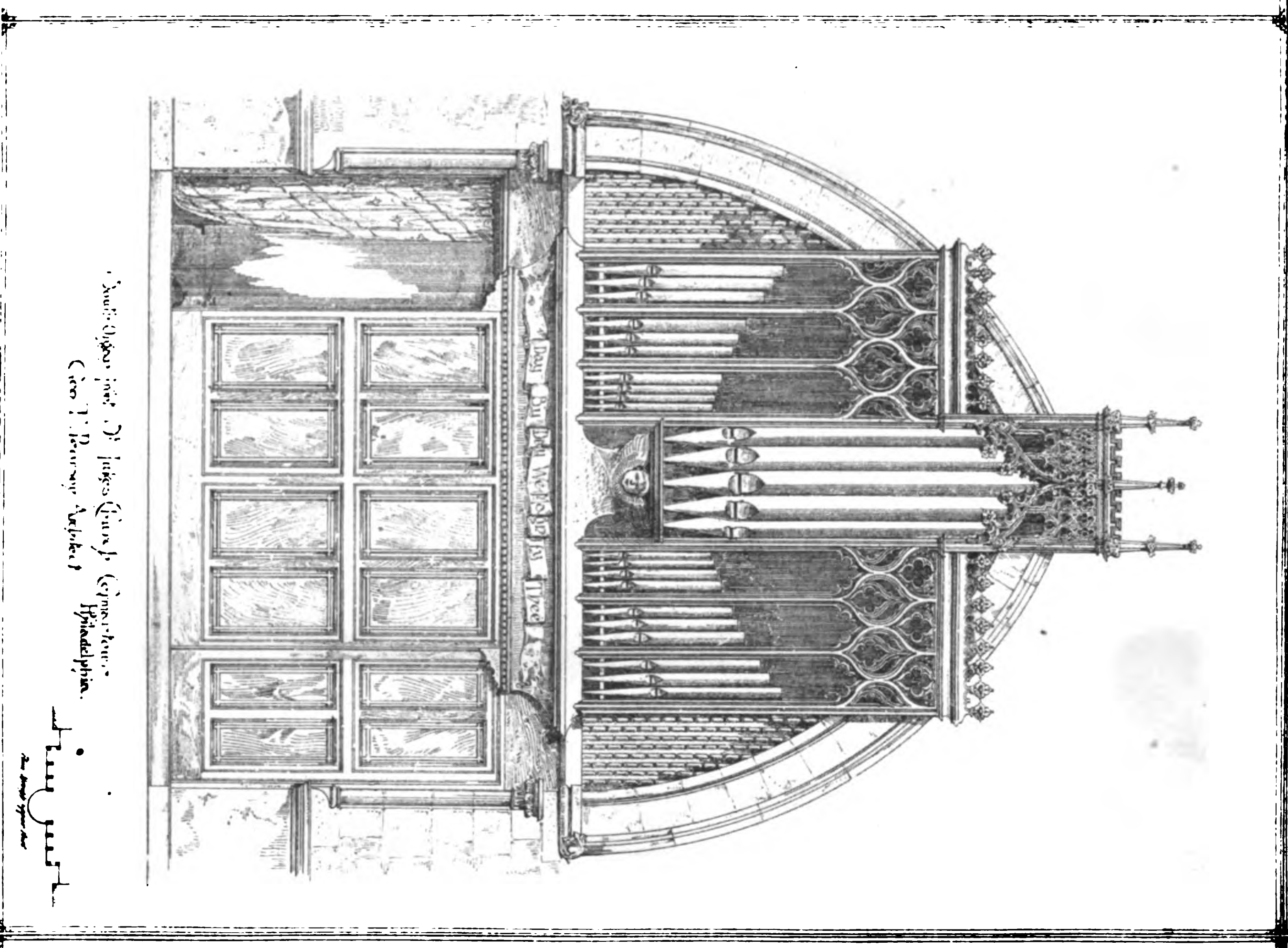

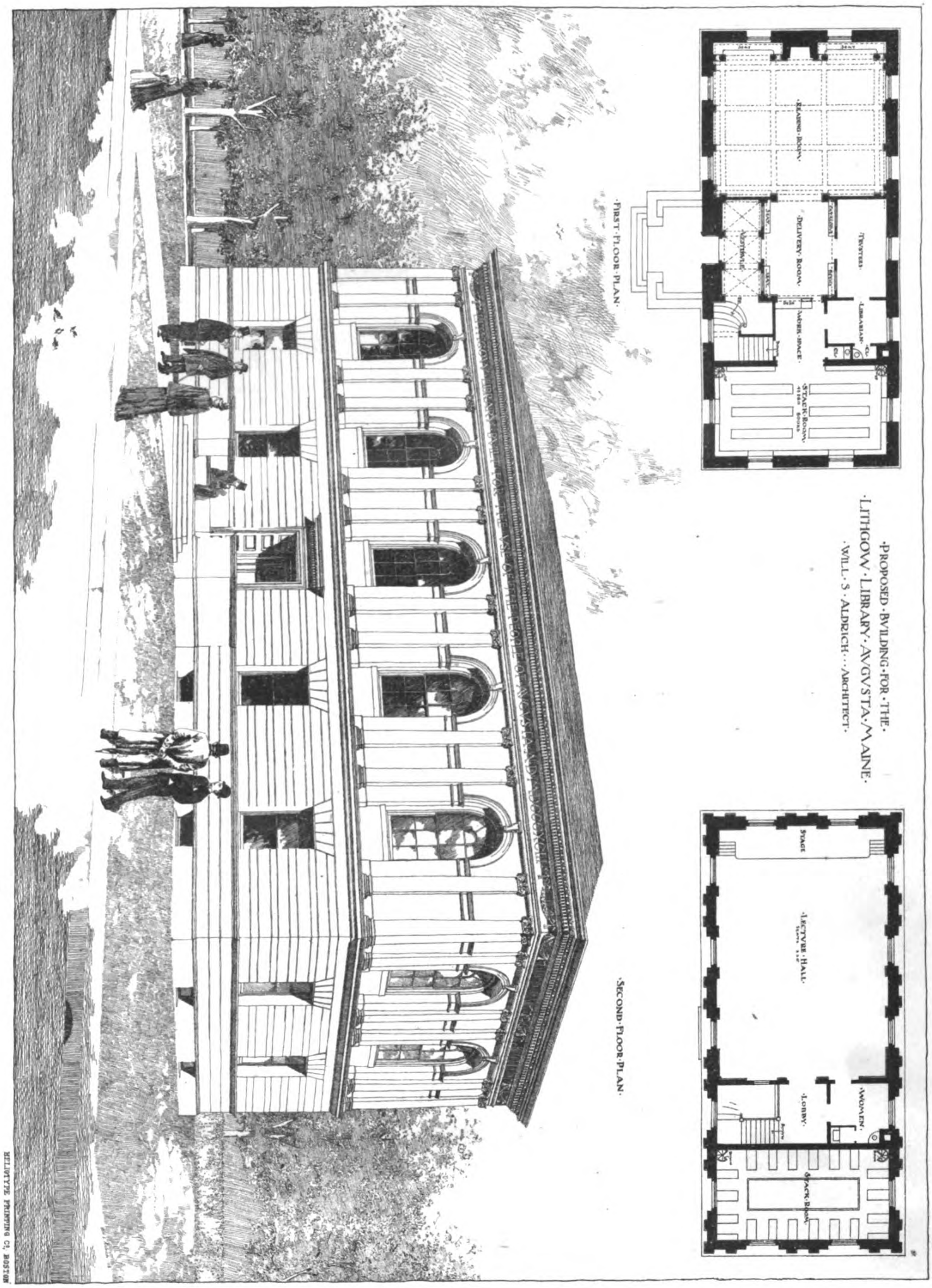
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STAGE
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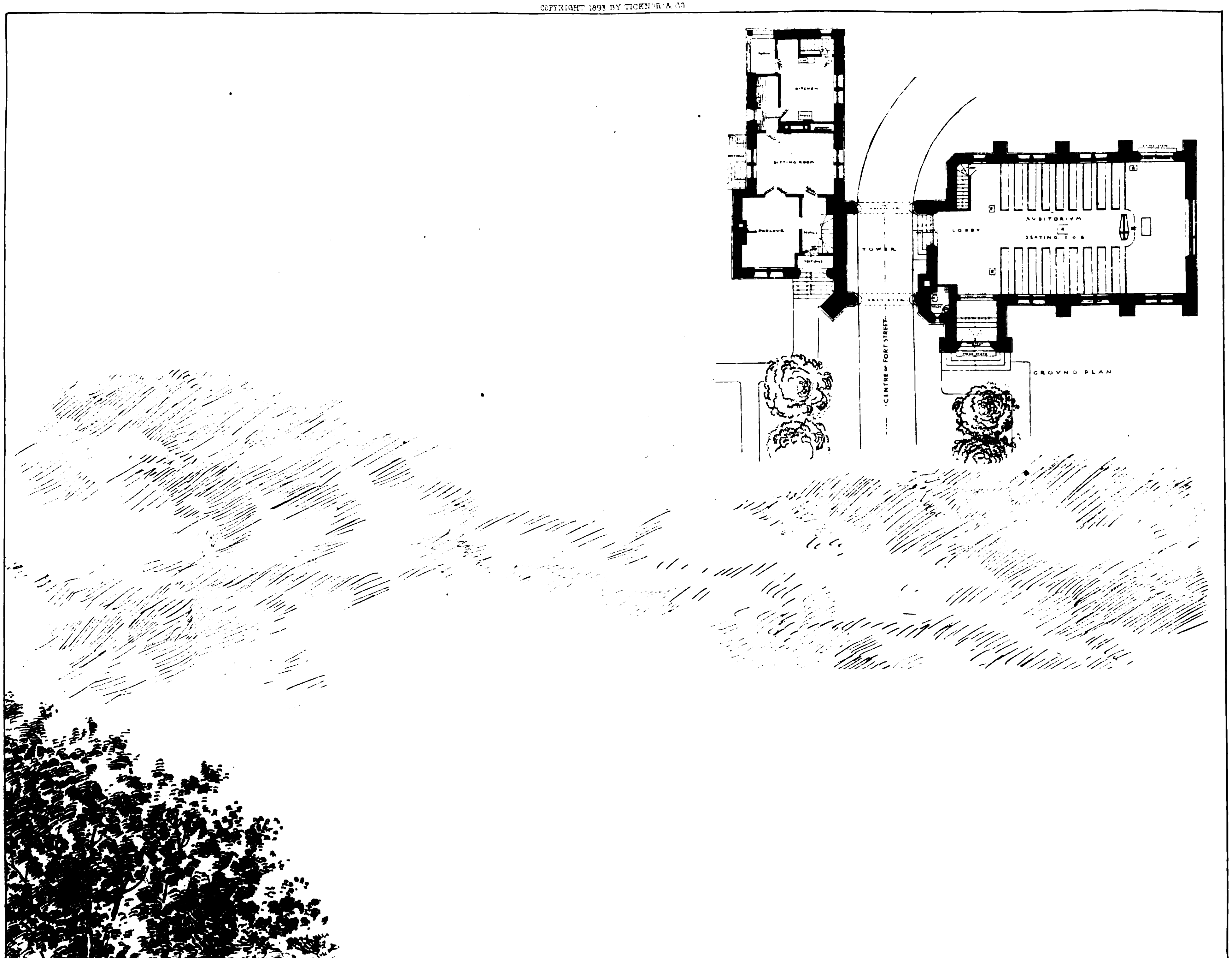
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LOBBY
TOWER
CENTRE OF FORT STREET
GROUND PLAN
KITCHEN
SITTING ROOM
PARLOUR
HALL

HELIOTYPE PRINTING CO. BOSTON

THE AMERICAN ARCHITECT AND BUILDING NEWS.

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DECEMBER 9, 1893.

CONTENTS

IT is gratifying to see with what unanimity the public is now clamoring for the preservation of the World's Fair buildings, which have certainly made an artistic impression on the country such as has never been felt before. Until within a few days, no proposition which seemed practicable has been made for keeping them, but a company has been formed which proposes to take in hand the buildings around the Court of Honor, replace the perishable staff with Portland cement on iron lath, keeping all the forms of the original, and paint the new material white. This will insure the preservation of the superstructure for many years, and it is proposed to strengthen the foundations, so as to prevent settlement and distortion. The company offers to do all this work, and to keep the buildings, grounds and waterways in order, for twenty years, in return for a concession for that period, entitling it to fence in the group of buildings, and charge a small admission fee. Independent of the question whether the company would find the enterprise profitable, there is no doubt that the city of Chicago would be benefited by the perpetuation of an attraction which may claim to have brought millions of strangers already to the city, and every artist would rejoice to see a little longer life accorded to the most renowned work that American architecture has yet produced.

A CORRESPONDENT of the *Deutsche Bauzeitung*, Herr Spies, of Ratisbon, who has made an extended tour in this country, writes an intelligent and appeciative description of the peculiarities of American building, dwelling less on the eccentricities of construction, such as the twenty-story office-buildings of the great cities, than on the details of execution and the novelties in material which he observed in watching actual work. After mentioning that American building is passing, so far as materials are concerned, from the wood, once almost universal, to brick and stone, he expresses his satisfaction at the sincerity with which these materials are used. In all his travels, which extended through fourteen States, he did not see a single building with a stucco front. He attributes this to the severe climate of the great Northern cities, which, he says, is very unfavorable to the use of stucco, and, as these cities set the fashion to the rest of the country, he thinks that stucco architecture is not likely to gain a foothold. Whether the climate of Washington, which he cites as an example, is more unfavorable to stucco than that of Berlin, where it is in universal use, may well be doubted, but it is certain that the stucco architecture of the last half-century, many specimens of which remain in the Northern cities, has completely lost favor here, and the fashion will, we hope, never be revived. Apart from this, Herr Spies found more gratification in observing the "thoroughly solid and skilful" masonry prevalent here. "In reading," he says, "of the extraordinarily short time in which the fabulously tall houses are built, one is tempted to suppose that this rapidity is gained at the expense of solidity and precision of workmanship. . . . One's astonishment is, therefore, greater in observing the minute care with which masonry, particularly brickwork, is carried out, not only in the facings, but also in the backing and the partition walls." "We must," he adds, "frankly confess, with a feeling of shame, that in this respect we have something to learn from the so-called land of humbug." The precision and perfect bond of the American brickwork is, he thinks, rendered easier by the excellence of the materials available, and he expresses his admiration of the regular shape and size, and uniformity of burning, even of the bricks used in interior walls. Two things about our brick buildings seemed to him curious. One was the flat arching now in universal use between iron beams. As he says, "it springs to the eyes" that the flat arches are very far from forming a theoretically correct construction, and he thinks it partly due to the regularity of shape of the blocks and the consequent thinness of the mortar joints, that they stay in place so well. The other curiosity of construction consisted in the furring of brick walls with wooden straps, on which laths are nailed. This practice he was unable to account for. He observed that, our brickwork being laid with closer joints than is usual in Germany, the back of the wall was much freer from the lumps and projections of mortar which the German plasterers depend upon to hold their work, and, in default of these, he reflects that, to make the plastering stick, it would be necessary to wet the wall thoroughly, and use good, sharp sand in the plastering mortar, and, as sharp sand is, he explains, rare in America, he supposes that it is found necessary to provide extraneous means of holding the plastering. Even under these circumstances, however, he thinks that it would be easier to find some other way than to go to the expense of furring and lathing, and he supposes that this is rather a "reminiscence from the time of wooden building," than a rational method of construction. The idea of the use of the furring to prevent the dampness of the wall from affecting the plastering does not seem to have occurred to him at all, yet wooden strap-furring is used on the Continent exactly as we use it, and for the same purpose, and its workmen's name in France, "*fourrure*," corresponding precisely to our term, indicates that it is regarded as a warm and dry covering for a wall disposed to be damp.

IT is, however, the wooden construction that interests Herr Spies most, and in nearly every part of this he finds something totally different from the German methods of building. Our floor-beams and other timbers, he says would be called planks (*Bohlen*) in Germany, as, indeed, they are here, but he acknowledges that, with a given quantity of timber, our thin beams, placed near together, give a stronger and stiffer floor than the German beams, which are nearly square in section, and placed much farther apart. He observes, however, very justly, that the most economical conversion of logs into beams is obtained, on the whole, by making the breadth about five-sevenths of the height, so that our thin beams are more wasteful of lumber than thick ones would be. There are a good many things to be taken into consideration, in this matter, one of the most important being the disposition of thick beams of spruce, our common framing timber, to twist and crack, but the principle is worth remembering. The way in which our flashing is done, with zinc turned up, and a lead cap, although not unknown in Germany, is, he says, unfortunately not so common there as in America, and the curb-gutter so much used south of Philadelphia seemed to him ingenious and simple. It surprised him to find doors, windows, frames and sashes, and other objects of what we call "mill-work," ready-made, of such good quality, and in such variety. Swedish doors are much used in Europe, but there is in the foreign markets nothing like the complete assortment of such goods that is to be found here. He attributes this in part to the disposition of our builders to follow uniform patterns in their houses, but the design of the outside of the house has little to do with the shape and size of the doors, and probably the American passion for

doing everything by machinery has more to do with it. Meanwhile, however, as our machine-made doors, blinds, sashes and so on are not only very good, but very cheap, it might possibly be worth while for some of our mills to send a consignment abroad for a market.

MANY American readers will regret to learn of the death of M. Racinet, the author of several books well known in this country. His first important work was the "*Ornement Polychrome*," which is familiar to every student of decoration. Coming after Owen Jones's "*Grammar of Ornament*," it immediately attracted attention by the beauty of its plates, and had a large sale, although, as the beauty of its coloring is obtained by shaded tints, it is hardly so valuable, in practice, as its predecessor, in which flat tints only are employed. His next work, the "*Costume Historique*," although extremely pretty, and containing some charming restorations, in color, of antique and mediæval interiors, is less generally known, and the later ones, such as the "*Céramique Japonaise*," although beautiful, do not appeal particularly to students of architecture. M. Racinet not only drew the illustrations of his books, but wrote the text, which, particularly in the "*Costume Historique*," is learned and valuable.

M. RAOUL PICTET has been making some curious experiments on the physiological effects of extreme cold. With the aid of various freezing mixtures, he has arranged what he calls "wells of cold," the air in which is cooled to various degrees. So far, the temperature in the coldest of these wells is only reduced to one hundred and sixty-six degrees below the Fahrenheit zero, but much lower temperatures are easily reached by other means. It is calculated by modern physicists that at about four hundred and sixty degrees below zero will be reached what is called the "temperature of death," or "absolute cold," at which all substances are solid, and at their extreme limit of contraction. M. Pictet has, of course, not yet attained this condition, but he has approached near enough to it to give some singular indications of what may be discovered later. In one of his experiments, a dog was introduced into a "well of cold," at a temperature of one hundred and thirty degrees below the Fahrenheit zero. For ten minutes the animal's vitality struggled successfully against the cold, and even raised, to the extent of half a Centigrade degree, the temperature of the well. At the end of this time, the dog's extremities began to freeze, but the heart and vital organs remained warm, and it was not until the end of an hour and a half that the temperature of this part of the animal was found to have been reduced one Centigrade degree. After this point was reached, however, the vital powers seemed to give way, the temperature suddenly fell, and nothing could revive the poor beast.

M. PICTET himself had the courage to try how such terrible cold felt. He plunged his bare arm into the well, at the same temperature which had proved fatal to the dog, and held it there for five or six minutes. At the end of three or four minutes, he felt a violent pain, proceeding apparently from the periosteum, or sensitive covering of the bone. After about two minutes of this, he withdrew his arm, and a sharp burning pain came on, caused, as he supposed, by the sudden reaction in the tissues. In experimenting on other animals, he found that the lower the organism, the better it seemed to resist cold. Fishes could be frozen hard, without losing vitality. If the temperature to which they were exposed did not sink below the Fahrenheit zero, and if the experiment did not last too long, they could be thawed out, apparently without injury. Frogs could be kept for a time in a temperature twenty degrees below the Fahrenheit zero, without harm, but they succumbed to a temperature of thirty degrees below. Snakes bore about the same degree of cold; and centipedes did not seem to be inconvenienced by a temperature of sixty degrees below. Snails were still more hardy, suffering no loss of vitality in a well at a temperature one hundred and eighty-four degrees below zero. This astonishing fortitude was, however, far surpassed by that of certain microbes, which M. Pictet froze up in a block of solidified atmospheric air, at a temperature three hundred and fifty degrees below the Fahrenheit zero. In this block, hard and solid as crystal, he kept them for some time, and then thawed them out gently, upon which they exhibited their usual activity. What can be the nature of a circulation which is indifferent to this awful cold, or of an organism in which circulation can be entirely stopped without injury, we can only conjecture, but M. Pictet's experiments, for the account of which we are indebted to *Le Génie Civil*, have certainly added another mystery to that standing enigma of science known as vitality.

IT will probably surprise a good many people to learn that the spot where Washington was born, although it has been perfectly well known ever since the event took place, has never yet been marked by anything to indicate it to a stranger. As all readers of the life of the greatest personage of the eighteenth century know, Washington's birthplace was in Westmoreland County, Virginia, on a plantation now called Wakefield, which borders for half a mile or so on the Potomac River, sixty-five miles below Washington City. For the last forty years the plantation has been occupied by Mr. John E. Wilson, who received it from his wife, Bettie Washington, the grand-daughter of William Augustine Washington, the half-nephew of the great President, but it is now owned by the Government, which has purchased it from Mr. Wilson. Washington's father, grandfather and great-grandfather spent all, or nearly all, their lives on the plantation, and his own infancy and boyhood were passed there. The house in which he was born was a plain, square, wooden building, with four rooms on the lower floor, and several chambers, but the frame has long since decayed, leaving only the brickwork of the foundations and chimney. Until within a few years, the chimney was still standing, but it has recently fallen. On the plantation is a family burial-ground, in which lie many of the Washington race. A spot more sacred in the eyes of Americans could hardly be found, and, for the present, at least, it has a charm that the much-visited Mount Vernon has rather lost; but it has been totally neglected, and it is only within a few weeks that a contract has been made, in the name of the Government, for the construction of a wharf, by means of which the place can be reached by boats on the river. The expense of this will be paid out of an appropriation of thirty thousand dollars, made by Congress for the general purpose of acquiring and commemorating the place. The purchase price of the plantation, which contains twelve hundred acres, was only a little over five thousand dollars, showing that sentimental interest does not count for much in the value of land in this country. The landing-pier will cost about ten thousand dollars, and there will be incidental expenses, so that the residuum available for commemorating the actual birthplace of the Father of his Country will be only about thirteen thousand dollars. It is hardly necessary to say that this would not go far in providing a monument, or other similar memorial, large enough not to look ridiculous in the middle of so extensive a tract, and, unless the appropriation could be considerably increased, we would suggest, with due modesty, that an effective way of using the small sum available would be to spend it, under Mr. Olmsted's direction, in beautifying the plantation by purely natural means. The remains of the house, and the family graves, should be secured from further decay by proper shelter, but, beyond this, our idea is that the object in view should be to secure, using trees, shrubs and grass as the medium, the utmost possible effect of appropriate sentiment. So far as we know, such an experiment has never been tried on anything but a very small scale. In fact, there are very few men in the world who could handle trees and shrubs, as a painter does his colors, with a knowledge of the effects produced on the mind by their combination, but Mr. Olmsted is one of them, and it is hardly too much to say that an entirely new field of art might be opened by such an essay. The circumstances would be particularly favorable. There is land enough to carry out an idea without having it spoiled by the intrusion of discordant neighboring objects: the Virginia atmosphere has naturally a tender haziness which lends itself to sentiment, and Mr. Olmsted knows the form, color, mode of growth, and, one may say, the expression, of every plant indigenous to that region. There would be no need of changing the topography, or in any way altering the general appearance of the plantation from what it was when Washington's childish eyes looked over it; everything would be done by planting, and a great deal of planting could be done with thirteen thousand dollars, with the additional advantage, that, when the time came for spending a hundred thousand or so on a more artificial memorial, what had already been done would be so much additional attraction to the place, while an insignificant monument would be only fit to be dug up and thrown away.

THE PRESENT ASPECT OF THE WORLD'S FAIR GROUNDS. — SALES AND FINAL DISPOSITION OF SOME OF THE BUILDINGS. — THE NEW MAYOR AND THE BUILDING-INSPECTORS. — THE ART INSTITUTE MOVING TO ITS NEW BUILDING. — EXHIBITION OF WATER-COLORS. — THE COLUMBIAN MUSEUM. — NEW OFFICE-BUILDINGS.

WHOEVER visits the World's Fair grounds now does so chiefly from a sense of duty, and if by any chance some stray wanderer may turn his steps that way with a hope of finding some bit of pleasure, he soon realizes his mistake and comes away disheartened and saddened by this impressive object-lesson on the perishability of all earthly things, especially of those which are made of staff, substantial as they may have appeared. Of all dreary places, this once gay and beautiful one is certainly the most dreary of all, and the present season of the year only adds to its hopeless aspect. With the foliage of the trees shapeless and frost-bitten, with the plants in a similar condition and with the wet snow and mud which has been present during the last week, there could be found on the grounds none of the beauties of winter and all of its discomforts.

As the fate of the large buildings has not been decided absolutely, of course nothing has been done to them. Tracks have been laid to their doors, and the roads have been torn up. One of the electric fountains has been removed and nothing remains but a hole and a pile of staff. The MacMonnie's fountain still stands, though no water falls around it, no gondolas or launches brighten the waters of the lagoon, even the ducks and swans have been disposed of, as no longer being required for a picturesque feature. The Intramural road has long since ceased to run, the stations have all been removed and the work of demolition has begun on the tracks.

Inside of the buildings the aspect is quite changed, and it is hoped by the first of January all exhibits will have been disposed of. The Horticulture and Fishery Buildings have been nearly emptied, and almost one-half of the Government exhibits have gone, a hole having been cut in the side of the building to permit the entrance of the cars which receive the boxes. In the big Liberal Arts Building all the decorations have been taken down, and cars run directly through the centre of the structure, though naturally the work of removal progresses more slowly in this place than in any other. The Electricity is quite bare of interesting features, the Mines and Mining has but little to show, in the Agriculture the pavilions are fast being pulled down, while, naturally, Machinery Hall empties more slowly. The Forestry Building is less changed than many of the others, as much of its contents has been given to the Columbian Museum, as is also the case with the Anthropological collection. The work of destruction on the Cliff Dweller's homes has begun and the curious structure is fast disappearing.

The question of what to do with the buildings has been an absorbing one all through the past month, and in the suggestions for their final disposal, impracticability struggles with the practical for the mastery. A few of the smaller buildings have been sold. The beautiful Cingalese structure, as well as the Cingalese booth in the Women's Building have been sold at auction and at such figures as to entirely discourage those most interested in them. The Cingalese structure as before stated in these letters, is rich in carving on the exterior as well as in the interior. The beautiful columns before spoken of are reproduced from historical ruins, which two thousand years ago were proud and mighty temples. The edifice, which is composed of twenty of the hard woods of Ceylon, was first constructed in that island and then, like several of the other buildings, was taken apart to be reconstructed here. This building with all its wealth of carving and rare wood was sold to a Chicago buyer to be used as a country or summer house, for twenty-eight hundred dollars, while it is reported it could not be duplicated for eighty thousand. The booth in the Woman's Building brought only one hundred and ninety dollars, which so disgusted the Cingalese that the sale of the remaining booths was declared off. Many of the carvings in the Ceylon Building have a deep religious significance, and would be especially interesting for closer study and investigation when they could be taken more leisurely than at the Fair.

It has been reported that the Maine Building has been bought by the North Western University to be removed to Evanston, there to be used as the headquarters of the Art-guild of that institution. It is known, also, that the Ohio Building has been sold for three hundred dollars and will be removed to Cincinnati, while the "jewels" which in front of it assumed the forms of Grant, Sheridan, Sherman, Chase, Garfield and Stanton, will be shipped off to Columbus to grace the grounds of the Capitol. The Wisconsin Building has been knocked down under the hammer, while the Colorado structure will meet the same fate, with Nebraska, North Dakota and West Virginia probably for companions. On December twenty-fifth, Christmas or no Christmas, the Illinois Building will go to the highest bidder. The New Jersey structure will be utilized as a residence for the Governor of the State at Trenton, while the Virginia Building has already been purchased and will be removed to Seventieth Street near Jackson Park. The Montana Building will eventually be transformed into a mountain hotel in West Virginia. Mr. Potter Palmer's gift of two hundred thousand dollars for the purpose of erecting a Woman's Memorial Building has made the offer of the New York State Building to this association not a desirable one to accept, and throws back this structure on the hands of the Commissioners. Mr. Palmer's plan is to erect this Memorial Building on the Lake Front, if legally he can obtain the right to do so, but wherever it is built, it is devoutly to be hoped that it will be more of an architectural success than most of his other buildings have been. If everything is placed on the Lake Front that there is talk of, there will remain but a few inches of ground uncovered, where now the Columbus of unpleasant notoriety looks down on the weary tramp in his noonday siesta.

The most appalling project has been that of removing the great Liberal Arts Building to this same site, there to make of it a "People's Palace." Some of our leading philanthropists, together with sundry unphilanthropic people, have been interested in this scheme, and one delightful solution of the query as to how to eat one's cake and still have it, has been suggested by one of the people interested in this plan. It is asserted by several of them that the structural ironwork of this building "can be removed without in any way detracting from the architectural beauty of the plan, whose walls are independent of these giant trusses and arches, and will remain intact after the removal of the latter. With these no longer in the way an unobstructed area of thirty acres could be gained to be utilized as a complete park in itself, improved with trees and shrubbery, flowers and fountains." Suggestions have run riot, and in the desire to save the buildings their absolutely perishable nature seems to have entirely vanished from the minds of many, and the papers teem with communications rich in such phrases as "preserve for ages those grand monuments of architectural beauty," etc. It has been suggested, as above stated, that the Liberal Arts Building should become the People's Palace, Machinery Hall become the Woman's Memorial Building on this same Lake Front, and the Fine Arts Building brought hither shall be transformed into the Columbian Museum. These visionaries do not state whether their plan would be to replace the staff with a more substantial exterior or not. If the entire outside shell of the building is removed and a new one substituted, it is hard to understand how there could be much sentiment about preserving the buildings. Surely the interior plans, though most suitable for what they were intended, are totally inappropriate for any other use. The matter of plumbing, heating and foundations alone would almost make new buildings of them, and if there is to be this kind of a "resurrection of the body" it would seem nearly as well to start out with an entirely new one, many and tender though the associations may be which cluster around the old shells. These are all very natural and very proper sentiments, but it is rather surprising to see practical business men giving themselves up to them. The World's Fair Directors come in with an occasional fact which slides away powerless before the enthusiasts of this removing party. The General Manager has figured out that to repaint the twelve buildings would cost thirty-six thousand dollars. Then the roofs would have to be looked after and there would be necessarily fire and police service. The mere matter of shovelling snow from the roofs last winter cost twelve thousand dollars. If the façades around the Court of Honor only are retained the cost would be of course much less. But with battered roofs, broken windows, heavy wind and rain storms, it would take but a short time to wreck all that might be left. The weather for the past six months has been most exceptional and that we may ever again have long seasons of rain seems to have been quite forgotten by the majority of people.

Absolutely as a matter-of-fact it looks now, however, as if no removal of the buildings would be attempted, but as if the Court of Honor and the surrounding structures would be turned over to the Park Commissioners and would be allowed to stand as long as their conditions warranted it, or at least until the repairs necessary for the preservation of their beauty became so extensive as to be impracticable for the Park Commissioners to attend to. Each day the conferences between the Directors and Commissioners assume a more definite and settled character, and it looks now as if by the time of the publishing of this letter it would be finally settled that this much of the Fair setting would be permanent, for a while at least.

The chief activity in building circles, outside of the immediate centre, lies in the remodelling of many of the buildings in the near vicinity of the Fair Grounds. Many of the hotels of last summer are being remodelled into flats and stores, and it has been estimated that twenty thousand families could find apartments of various kinds, in this quarter. Unfortunately for the neighborhood in which they are erected, many of those buildings are of the cheapest possible character that could be put up without violating the building ordinance of that time, and very naturally cheapen and harm the neighborhood in which they are situated. Of course, some of the hotels were of a better character and are being remodelled into a more desirable class of apartments: still the fate of this part of the city, as to its future character is far from being decided.

After the assassination of Chicago's Mayor a new official has stepped into his place, who certainly is beginning well. The matter of building-inspectors is being rapidly changed by his attitude, and the affair which at one time promised to be a long and tedious one

is being brought rapidly to an issue. Soon after the new mayor was installed in his office he was informed that a committee made up of a representative from the Builders' and Traders' Exchange, the Building and Trades Council, the Fire Underwriters' Association and the Illinois Chapter of the American Institute of Architects, would call upon him in regard to the inspectors of buildings. The committee had word sent it, however, that no visit was necessary, as the building ordinance would now be enforced in all respects. He said, "The order I have issued to the Commissioner refers to the past, present and future. If he has any inspectors who did not pass an examination as required by the ordinance, he must discharge them and fill their places by men selected in accordance with the provisions of the ordinance. Hereafter, as long as I am in this office, when a vacancy occurs it must be filled according to the provision of the ordinance. The order passed by the Council, under which inspectors have been appointed without an examination, is illegal. An order cannot become effective as against an ordinance." As will be remembered, perhaps, the ordinance as passed last spring required that all inspectors should pass a satisfactory examination before a board composed of representatives of the four associations above mentioned. The candidates sent in were only those who had first been approved of by Mayor Harrison and one of his minions, and their chief qualification was that they were all Democrats. Four were saloon-keepers. The examinations were conducted most conscientiously, and but few candidates were found qualified for the office. This course of things was naturally unpleasant to the "gang," and the examinations were ordered stopped. Finally an order went to the Council in June, providing that the Commissioner, with the consent of the mayor, might appoint such persons to the position of inspectors as had passed an examination to *his* satisfaction. This order was smuggled through the Council and many of the Aldermen knew nothing of it. The examining-board, as soon as offices of inspectors were filled with men that it knew nothing of, tried to sift the matter to its foundation, but were in every way harrassed and hampered by the friends of the mayor and the Commissioner, who were in all places of trust around them and ready to promote their schemes. The ex-Corporation Counsel expressed the opinion that the order was ineffectual as against the ordinance, because the order was passed by a *viva voce* vote. Thus the matter, though supported by the right looked rather uncertain, till the advent of Mayor Swift gave a more encouraging aspect to the affair. It is to be hoped that such a good beginning will develop into something better than a mere assertion.

The Art Institute is again in a state of chaos, and is practically indulging in another moving, which its officers, doubtless, hope will be the last for many a long year, after the repeated attacks of similar catastrophies in the past. The great halls of Washington and Columbus are being torn down. These, it will be remembered, were temporary structures built in the court of the building for the accommodation of the men and women who gathered there in the Congresses, whose interests reached from psychical research to agriculture and real estate. According to agreement, these edifices have been demolished, the entire building which has been at the mercy of the invading hosts is being cleaned and renovated, and many of the museum's treasures, which have been stored through the summer because of lack of room, are fast being put in place. The French Government has made a gift to the Institute of the wall-decorations with which it embellished the walls of its rooms in the Fine Art, French and Manufactures Buildings. This work, as before mentioned in these letters, was especially well carried out and carefully designed, and doubtless will, if possible, be used in some of the rooms and galleries of the Institute. The time when the beautiful Trocadéro casts will be finally placed is being awaited with impatience by those interested in such matters. The opportunity to carefully study them will be much greater when they are removed from the manifold attractions with which they were surrounded at the Fair. That part of the Institute's possessions known as the Eldridge G. Hall collection has been enriched by a goodly number of works from the French sculptural department. The list is as follows:

"First Burial" by Barrias; "Mozart as a Child" by Barrias; "Rhinoceros and Tigers" by Cain; "Jeanne d'Arc" by Chapu; "Security" by Delaplanche; "Man of the Stone Age" by Frémiet; "An Ancestor" by Massoule; "The Wounded Dog" by Frémiet; "Lion and Crocodile" by Cain; Four figures from the tomb of General Lamoricière by Dubois; "Salammbo" by Idrac; "Guardian Spirit" by St. Marceaux; "David the Victor" by Mercié; "Even So" by Mercié; "Citizens of Calais" by Rodin.

The only oil-painting that comes as a gift to the Institute is William M. Chase's "Alice," though several of the pictures in the loan collection will hang for the first time on its walls, though given to the institution last spring. These are:

"Bringing Home the New-born Calf" by J. F. Millet; "The Song of the Lark" by Jules Breton; "The Potato Field" by Ludwig Knaus; "Women of Sahara" by Eugène Fromentin; "Going Home" by Constant Troyon; "The Lock" by John Constable.

There has also been presented by other friends a full fac-simile collection of the Naples bronzes from Pompeii and Herculaneum; from the Swedish section the statue called "Snowdrop" by Hasselberg, as well as the relief "Linnæus" by Christian Eriksson; from the French, the statuette "Anacreon;" while from the English comes a bust of the archbishop of Canterbury. As part of the library of the Institute, there has lately been secured a complete series of Braun & Co.'s carbon photographs and autotypes of famous works of the European museums.

The Chicago Society of Artists has just been holding its annual water-color exhibition. The club has this year two prizes to offer to its exhibitors, established by friends, patrons outside the society, and does not in its exhibition, confine itself exclusively to the works of its own members. The prizes go to no artist who is not an actual resident of Chicago. The exhibition, though not large, contains some very charming things and several that are marked by decided cleverness. As usual when there are awards, there arises to those outside of the jury, the question, why the honorary ribbon should be pinned onto such an one, rather than on, say, your modest favorite in the corner yonder. Chicago does not seem to have reached the period "when art is still religion," when she can gracefully and gratefully support an artist population, and the path of genius and talent, it is to be regretted, is far from being strewn with roses here.

The gifts which are constantly pouring into the proposed Columbian Museum bid fair to make of its contents a World's Fair on a small scale. The following list as published in one of our daily papers seems to be an average specimen of the variety of the nature of the gifts: Sharks' jaws and mounted specimens of fish. Model of a packing-house and dock, illustrating the receiving and packing of lobsters in New England. Three oil-paintings of fish, sturgeons' sounds and isinglass. Spoon bats, including first ever made in America. Two hundred oil-paintings from photographs of the tribes on the Amazon. Classifications in such a collection will be no small undertaking, though probably much of interest will be found in it, taken as a whole. The general fund seems to be growing and since last writing has been augmented by numerous large gifts from wealthy citizens.

As above stated, much of the work in architects' offices is now repair jobs. Prominent in new work, however, will be the large office-building which is to stand on the site of the old Honorè Block. This was a very good five or six story office-building, which is now being torn down to make room for a modern sky-scraper. A similar fate has been dealt out to the old building on the corner of State and Madison Streets, a very good structure in itself, but like the Honorè Block, not able to compete with the luxurious modern office-building, well-lighted, well-ventilated and well-heated.

The Post-office addition is fast nearing completion. As it was considered absolutely necessary that this structure should be enlarged to accommodate the rush of business which would come at the World's Fair times, it is a noticeable example of the swiftness of Governmental movements, inasmuch as it is only just now finished, when all is again quiet. The extra room, however, is needed for the ordinary postal business of the city. In appearance, the addition taken in connection with the original building realizes the worst hopes of the most pessimistical.

EXHIBITIONS OF THE STAINED-GLASS DESIGNS FOR THE CATHEDRAL OF ORLEANS. — HISTORY OF JEANNE D'ARC. — OBJETS D'ART IN THE LOUVRE. — RAFFET.

MONSEIGNEUR DUPANLOUP, formerly Bishop of Orleans, opened, in 1878, a subscription for filling with artistic stained-glass the great pointed bays of his cathedral. In a short time he collected the sum of one hundred thousand francs, but, just as he was on the point of making use of it, he died. His successor, M. Coullié, wishing to follow out the work already begun, in 1879 opened a public competition, which produced fairly happy results; but following a decision, which roused up violent protest, the State intervened and caused the competition to be annulled by the Administration of Religious Bodies. And now it was the bishop's turn to protest, and there was no longer talk of competition. But this year, in spite of ill-will, the aforesaid Administration has succeeded in organizing a regular competition, and from the 8th to the 19th of October last, the artistic world hastened to the École des Beaux-Arts to admire the results of it.

The programme, very clearly expressed, provided for the execution of ten windows illustrating the following subjects, including within their leading lines the principal episodes of the history of Jeanne d'Arc:

First Window. — Dorémy. Jeanne hears the voice from Heaven. Valley of the Meuse. House of Jeanne d'Arc. The Church (1425).

Second Window. — Vaucouleurs. Jeanne on horseback, setting out to join Charles VII at Chinon (February 25, 1429).

Third Window. — Chinon. Jeanne is presented to the Court of Charles VII (March 8, 1429).

Fourth Window. — Orleans. Jeanne on horseback enters by the Burgundy Gate about 8 in the evening by torchlight, preceded by her standard (April 29, 1429).

Fifth Window. — Orleans. Jeanne at the assault on the boulevard and the Fortresse des Tourelles (May 7, 1429).

Sixth Window. — Orleans. Jeanne, after the freeing of the city, renders thanks to God in the Cathedral of the Holy Cross (May 8, 1429).

Seventh Window. — Rheims. Jeanne at the Consecration of Charles VII in the Cathedral (July 14, 1429).

Eighth Window. — Compiègne. Jeanne is made prisoner in front of the city (May 23, 1430).

Ninth Window. — Rouen. Jeanne a prisoner in the tower of the Château (1430–1431).

Tenth Window. — Rouen. Jeanne on the funeral pile in the Place du Vieux Marché (May 30, 1431).

The competitors were required to prepare a sketch at a tenth scale of these ten windows, a full-size design for one of them, and a fragment of the glasswork itself. The statement indicates the importance of the competition, the effort which it demanded and the studies which were required. Assisted in the composition for the greater part by well-known artists, twelve glass-stainers took part in this artistic struggle, which in a lively degree interested the Parisian public. These men were MM. Denis, E. Hirsch, Charles Champigneulle, *fils*, H. Carot, J. B. Anglade, Vantillard, Felix Gaudin and L. J. Galland, all of Paris; M. Florence Lobin of Tours, M. Bulteau of Rheims, M. St. Blancat of Toulouse, and M. Latteux-Bazin of Le Mesnil-St-Firmin (Oise).

In spite of the really good qualities which the majority of these offerings exhibited, there were three which made the greatest impression. First, that of M. Felix Gaudin, made with the collaboration of M. E. Grasset; second, that of M. Champigneulle, with the assistance of M. Albert Maignan; and third, that of M. L. J. Galland, who had for his associate M. Gibelin. The others were not distinguished by any marked originality, and seemed to have taken little care to make a design which could be carried into execution; and this alone was enough to condemn them.

The windows which were to be decorated being fourteenth-century work, it was not uninteresting to find inspiration drawn from the masters of that epoch, and to see that their methods of composition had been consulted. The wisdom of doing this was very well appreciated by M. Grasset. His sketches were marvellous pieces of archæological research, expressed with the same sentiment that exhales from the old missals, with perhaps a little less of naïveté. His window, very compact in its design, though his sketches indicated a confusion which would be minimized probably in the execution, evidenced a long and serious study of the art of working in stained-glass, reinforced by his ability as a designer, which only heightened the charm of the work. The framework and the clerestories of the upper parts of the pointed windows were ornamented with motives in which allegorical figures, shrewdly selected to accompany each of the subjects, were treated themselves with great knowledge from the point-of-view of types, costumes and decoration. Unfortunately the simple drawing in outline for the full-size glasswork (six metres in height by three and one-half metres in width) gave to the *ensemble* an air of confusion and exaggeration of detail. The stuffs of the costumes, which in execution would have furnished great uniform spaces in spite of the drawing with which they were covered, merged themselves one in the other through the absence of all color. This mistake in presentation was carefully and skilfully avoided by MM. Galland and Gibelin, who had the wit to present their full-sized window in color. By this means they enabled the jury to obtain a more definite idea of the decorative effect of the stained-glass, where the color plays the principal and brilliant part. Their composition, moreover, without perhaps being as learned as that of M. Grasset, had much character, and one easily perceived in it the study of, and inspiration drawn from, the old masters.

The jury, which was composed of MM. Bonnât, Bouguereau, Puvis de Chavannes, Paul Dubois, Didron, De Baudot, Danjoy, Vaudremer, Corroyer, Böeswilwald and four delegates from the County of Orleans, appointed by the diocesan authority, awarded the prize to the design of MM. Galland and Gibelin.

The sketches of M. Albert Maignan for M. Champigneulle were very prettily handled in a charmingly poetic feeling. They suggested a ravishing piece of water-color work worthy to hold a place in a museum, but hardly one to be executed in glass and lead by artisans.

It is well known that for several years it has been sought to give an important place to *objets d'art* at the annual exhibitions. The same effort is making at the Louvre, thanks to the appointment of M. Molinier as *conservateur des objets d'art*. The halls devoted to this part of the museum have been completely revamped, and the objects have been arranged after a definite method, and the models and plaquettes begin to constitute a collection of real value. These have been arranged in order, and the French, the German and the Italian works have been placed by themselves. All the wealth of our museum is exhibited in separate showcases, logically grouped and arranged, which makes the collection ten times more valuable than it was in its former unmethodical and disordered condition.

In the hall devoted to pastels have now been placed miniatures, snuff-boxes, bon-bon boxes, and "*boites à portraits*," the collection of M. Ph. Lenoir. All these objects, a great part of which belong to the thirteenth century, add life to and form a setting for the charming elegance of the pastels of Latour and Perronneau.

Since we are at the Louvre, let us point out in the Garden of the Infanta a monument which has just been erected to the memory of Raffet. Raffet was a pupil of Charlet, and was born at Paris in 1804. He was quite young when his father was assassinated. He was then obliged to begin an apprenticeship with a wood-turner, and it was only in his leisure hours that he could study drawing. Charlet interested himself in him, and offered to give him lessons. Raffet devoted himself entirely to lithography and engraving, and his work, while having strong analogy with that of Charlet, was yet distinguished from it by a more heroic character. The lithographs in which he depicted certain episodes of the battle of Waterloo and the celebrated plate "Reveil" are real poems. It is the chief figure in this last work which has inspired the motive of the monument just inaugurated. A drummer of the Guard, moustached and wearing a shako surmounted by a lofty plume, is vigorously beating the charge, and wakening about him the dead and dying. One feels in this simple design the warlike breath of that grand epoch. We find the same drummer at the foot of the column, upon which has been placed a bust of the artist. The column of stone rests upon a broad pedestal, which forms a platform over which marches the legendary grenadier, while accessories, arms, bucklers and palms are fastened against the column, forming attributes. Like the grenadier, full life-size, they are all bronze and so stand out vigorously against the color of the stonework — too vigorously, even, so that they do not form an ensemble with the column. The grenadier, entirely independent, and planted upon the large socle like an ordinary personage, makes one fear that he may start off and leave it. The socle is not very high, and with a single step he could descend from it. Nowadays this adaptation of the human figure is a little too much abused in our monuments, from which it might at any moment be separated so as to give place to another. This is altogether wrong, as such a loss might take away all of the original character of a work, since it might be transformed or lose one of its elements without being absolutely destroyed at one stroke. There is no longer cohesion between all the portions of a monument which is composed of different elements fastened together haphazard, and easily transposable. For instance, why should this grenadier on Raffet's monument be at the right rather than at the left or in front? His place is not properly one point rather than another, and if it were desirable he could be made to step forward from time to time, and finally make a complete circuit of the column, after the manner in which children play with their mechanical toys. This gives life to the work, explain the defenders of this fashion, but is it reasonable that a work should have life in this acceptation of the word? It would better content itself with having sentiment and inspiring sentiment.

THE "ARTS AND CRAFTS" EXHIBITION, LONDON.

THE Society of Arts and Crafts is generally commended for its wisdom, in having allowed an interval of two years to elapse before again inviting the disciples of the Dante-Rosetti-Burne-Jones cult and the Philistine public to an exhibition in the new gallery of its ideal of furniture, fittings and decoration, for our churches and our homes. The homes, however, to be adorned by the specimens now, and hitherto exhibited, would need to be the abodes of wealth and luxury, since the expense would preclude the man of moderate income from becoming their happy possessor.

As was to be expected, the present exhibition bears a close resemblance to those of previous years, consisting of designs for all kinds of decorative objects, such as stained-glass, frescoes, wall-papers, tapestries and other hangings; some of these latter being ornamented by or composed of exquisitely dainty embroidery on silk or linen. The hammered metalwork in the form of sconces, dishes and shields, in copper and brass, display no novelty, though some hammered-silver brooches, etc., remind us of old Italian jewelry in their quaintness.

It is gratifying to note a decided improvement in the style of the furniture shown, and also that there is less of the cabinet-makers' show-room element about it, on which we animadverted on a previous occasion.

It may probably savor of carping, to say that there are too many cartoons for stained-glass windows, but, without doubt, until the design is fully completed, and *in situ*, it is quite impossible to form a just estimate of its value as a work of art. Occupying, as they do, the first place among the cartoons, special mention must be made of a set of six, designed in 1862 by Mr. D. G. Rosetti, to illustrate the story of St. George and the Dragon. They are all treated somewhat unconventionally, from the ordinary sort of hamper, containing the skulls of the victims, to the present-day family-carriage in which the Princess returns with her deliverer; while we need scarcely remark that St. George, instead of being in such a position as to be almost certainly killed himself, is on foot, and hewing at the monster in a most workmanlike fashion. One of the set — "the Princess Drawing the Lot" — is in water-color, and, though the color is subdued in tone, as befits the subject, the beauty of the design, and its well-balanced figures and proportions are considerably enhanced.

There is a charming naturalness and absence of crowding in "Christ Blessing Little Children" by Mr. Burne-Jones; but to five

other cartoons by the same artist, we can, by no means, give unqualified praise. "The Stoning of Stephen" is badly drawn: instead of an infuriated mob casting stones, we seem to see slightly excited lay-figures, throwing snow-balls. In "Paul Preaching at Athens" the artist has portrayed the divided opinions of the Apostle's hearers. "The Burning Bush" is treated rather poetically, but in the remaining three drawings there is nothing noteworthy.

Remembering that the grave has scarcely closed over the remains of the late Mr. Ford Madox Brown, whose lamented death occurred quite suddenly, about the time this exhibition was opened, criticism would be unseemly. We merely name his designs for stained-glass; "The Nativity" and "The Crucifixion"; and for Durham, a set, illustrating the story of St. Oswald.

In domestic stained-glass, the designs by Mr. Selwyn Image, Mr. Louis Day and Mrs. Newill are about the most suitable: "Brownies" by the former being capital, and the "Babes in the Wood" by the latter most charming.

Among the more noteworthy exhibits in the West Gallery, are Mr. Richmond's sketches of his designs for the decoration of the choir of St. Paul's Cathedral; indeed, in these few drawings, is foreshadowed one of the most important schemes of decorative art on a great scale, which has ever been undertaken in England. Mr. Richmond is now engaged in carrying out the decoration of the apse and the choir; and the work has made such good progress, that the first portion of it will probably be finished by next Easter. The choir comprises an arcade of three bays, besides the apse farther eastward; and the decoration, of which the sketches give a fair general idea, embraces the whole of the wall-surfaces above the springing of the arches, the vaulting, and the domes formed by the latter. Moreover, glass, for the clerestory and apse windows is also included in the complete scheme. It will thus be seen that this is a work of the first importance, and of great magnitude; not only in what is here shown, as being actually in progress, but in that it must form the keynote, both as regards style and color, of any future decorations. The Cathedral is now committed to the style of a particular school or period of mosaic, and it must be said at once, it is not that of the Renaissance, of which St. Paul's is such a striking example. In the completed spandrels of the great dome, the style of the Renaissance has been taken for granted, as most suitable to the architectural surroundings; Mr. Richmond goes back centuries before it and seemingly founds his work on the mosaics of Ravenna and other early work; and when it is completed westward, as far as the dome, we shall have the two distinct styles and their characteristic treatment brought into juxtaposition. Apart altogether from the success or otherwise of the scheme itself, one cannot help questioning the wisdom of the choice of style, and its appropriateness to a seventeenth-century church. The decoration as such, may be, and doubtless is, very noble in design and color; but that it is the most suitable for St. Paul's is quite another matter. When we come to the glass as an integral part of it, there can be no question, that if it is being carried out as indicated by the sketches, it will be entirely out of place in such a church. In the mosaics, Mr. Richmond has, by his great skill, to some extent succeeded in harmonizing the treatment of the early work and the later architecture: but in the glass, no attempt seems to have been made in this direction; so much so, that, judging from the sketches, it is simply everything that the windows should not be, in such a building.

The subjects comprised in the sketches, are thus apportioned: in the spandrels of the choir arcade—"The Angels of the Passion," "The Creation of Planets," "Eden," "The Expulsion from Paradise," and "The Annunciation." In the spandrels of the clerestory windows, "The Sybils and the Prophets," of which the cartoons for the Persian and Delphic sybils are shown full size. In the three domes, "The Creation of Birds, Beasts and Fishes" and in the pendentives of these domes, a series of angels. All these are designed in a broad, dignified and masterly manner. They are in color on a gold ground, but of their ultimate effect, it is impossible to judge till we see the completed work *in situ*. Suffice it now to say, that if the result may be judged from these general sketches of its conception, we may with no small confidence look forward to a great success.

There is a sketch for one of the Manchester Town-hall series of frescoes by the late Mr. F. Madox Brown, "The Expulsion of the Danes from Manchester," most vigorously treated throughout. The derisive laugh on the face of the mail-clad warrior is splendid, as he turns back to shake his spear at the townspeople; while, notwithstanding the general *sauve qui peut*, a wounded officer is being most tenderly borne over the drawbridge by his anxious men; the very dogs barking at the retreating foe, and old men and children throwing missiles at their heads. With regard to these fine frescoes, with which many of our readers are doubtless acquainted, we regret to hear that they are not receiving the care they merit. Mr. Pooley, Deputy Chairman of the Manchester Art Gallery Committee, going into the Town-hall one day, observed marks of deterioration, such as cracks caused by visitors knocking them. He once found the descriptive cards leaning against them; while smears across the pictures showed that the stone-cleaners were in the habit of wiping them over with their dusters. All this manifests disgraceful carelessness on some one's part; and it is time, as Mr. Pooley wisely says, that the people of Manchester bestir themselves, to save "the glory of Manchester." He prophesies that as people now go to Venice to see the great works of Tintoretto and Veronese, so will they in future years come to Manchester to see the works of Ford Madox Brown.

"Angels in Adoration," the subject of a design by Mr. William Morris for a fresco in a church, is both pleasing and devotional in style of treatment; but surely Mr. Morris might occasionally vary his foreground, and not give us those perennial flowers.

On entering the West Room the attention is at once arrested by the very fine piece of Arras tapestry "Sir Galahad and the Holy Grail," a portion of the San Grail series, designed by Mr. Burne-Jones and executed by Morris & Co. This truly beautiful work would alone amply repay a visit to the New Gallery. In the background of the design is a leafless wood, on the left a lake, while in the centre of the tapestry two armor-clad knights earnestly entreat some glorious angels who stand there with out-spread crimson wings. Sir Galahad, however, has pressed on to the Tabernacle of the wood and while kneeling there, his enraptured gaze falls on the sacred object of his quest. The expression depicted on the various countenances displays marvellous skill, as does the harmonious blending of the varied hues. "Love," a nearly full-size design in water-color for needlework, is by the same artist and lent by Mrs. Muir Mackenzie. Here again we see both majesty and beauty: the goddess, holding an unstrung bow, stands before us, her splendid double wings of a rich crimson color, in which doves are nestling, being finely set off by the deep blue sky which forms the background. No needlework could add to the charm of this example of pure decorative work.

We must not leave the tapestries without a notice of one from the pencil of Mr. William Morris, and executed at his establishment. A quartette of girls stand in graceful attitudes in an orchard, well shielded by a thicket, and "high overarched" by vines and fig trees; while behind them and on either hand, are apple and plum trees, all richly laden. With these fruits, and the inevitable foreground of flowers, the girls' dresses combine to form a rich harmony of color. The whole is in illustration of the following lines in form of a legend worded over the tapestry.

"Midst bitten mead and acre shorn,
The world without is waste and worn;
But here within our orchard close
The guerdon of our labors shows.
O valiant earth, O happy year
That mocks the threat of winter near,
And hangs aloft from tree to tree
The banners of the spring to be."

ARCHITECTS' CHARGES.

With the consent of both parties, the *Builder* publishes the following letters between Mr. Edwin T. Hall, F. R. I. B. A., and the Lord Chief Justice of England:

57 Moorgate Street, London, E. C., August 9, 1893.

To the Lord Chief Justice of England:

My Lord,—

Re Architects' Charges.

I am sure the vast majority of architects desire not only to avoid disputes with their clients, but still more to avoid even the suspicion of making inequitable charges for services rendered.

The general principles enunciated from time to time by your lordship in regard to architectural charges, reaffirmed in the recent judgment in Farthing *vs.* Tomkins, naturally place all such architects, of whom I have the honor to be one, in a dilemma. May I venture to ask your patient consideration of the following statement, in the hope that you may appreciate the difficulty and delicacy of our position, and may see on what basis charges may in our opinion be fairly made *when there has been no express agreement*, and when the actual building is not erected.

In order to arrive at a clear understanding of our position, I desire first to say that the services which an architect renders may be thus sub-divided:—(*a*) The thinking out of a design, *i. e.*, the application to the problem set by the employer of the architect's creative faculty developed by study, training and experience. The first expression or result of this design is the preliminary sketch. (*b*) The maturing of the design by most careful study of every detail, not only of artistic expression, but of convenience of arrangement, providing adequate light and aëration for all parts of the building, the scientific construction for stability, the drainage, heating, lighting, etc. This is expressed by the working-drawings and specification, and, as doubtless your lordship knows, working-drawings not only comprise general plans, sections and elevations of a building, but drawings to a large scale of many parts, and full-sized drawings of every moulding, of the brickwork and masonry, of all skirtings, architraves, door and wall panels, staircase (newels, balusters, strings), plaster and wooden cornices, etc., while the specification is a mass of detail. (*c*) The necessary explanation of all these to the quantity-surveyor, and to the competing builders so as to obtain estimates. (*d*) The general superintendence of the building while in progress, giving directions to clerk-of-works, builder and specialists of all kinds, and the certifying of payments. Incidental to all these are constant interviews and correspondence with the client.

I think, where no special arrangement exists, that a charge of five per cent on cost for all these services, on other than small or special works, may be assumed to be modest, fair and reasonable, from the fact that it is accepted by a larger percentage of clients than that of people who adopt a generally accepted view on almost any subject, and your lordship has judicially given effect to this view.

Considering the many thousands of works carried out, I think your lordship will recognize that the disputes on charges which come before the courts are very few.

If, therefore, five per cent be reasonable for all the services enumerated, it may with fairness be affirmed that the more important of the functions of an architect are embraced under the division *a*, *b* and *c*; for, given the completeness of the work therein comprised, it is evident that the supervision of the execution will require less close application and attention on the part of the architect. Further than that, the actual outlay by the architect in the payment of staff, etc., is almost exclusively confined within the headings *a*, *b* and *c*. It is not, therefore, illiberal to allocate two-fifths of the remuneration to division *d*, leaving the three-fifths for the earlier divisions, and that is a general practice which is broadly admitted by the great body of clients to be reasonable and fair, as evidenced by the rare occasions on which it is questioned. Indeed, I think in many cases when it is questioned, the real reason is that the client who has abandoned a scheme is annoyed that he has, so to speak, to throw away money on services no longer of value to him. I would, with submission, suggest that the translation of the architect's design from the abstract or pictorial building into the concrete or material cannot in equity affect the value of the services rendered previously to reaching the stage of translation; nay, it is possible that an architect's services may be dispensed with previously to that stage, and the building be carried out without his supervision. This is certainly sometimes done when the building has to be executed abroad, a long distance from London, where the work may have been designed. In either case the services for the stages *a*, *b* and *c* are complete, and if the basis of charge for the whole of the four stages, *a*, *b*, *c*, *d*, be a percentage, then with equal equity that for the first three stages may be a percentage, or, in other words, may be treated as a fixed proportion of the whole.

There are, of course, exceptional cases where a percentage charge cannot be made with justice to the architect. To cite only one, for example, say an alteration where the outlay may be little, but the ingenuity of the architect may be great to compass the desired end, and the supervision may be relatively excessive.

In this relation it is pertinent to note the recent case of Watson *vs.* Lewis, tried before an Official Referee, judgment being given for the full amount of the architect's claim, and on appeal this judgment was upheld. In this case the charges (often for work not carried out) were largely in excess of any that an ordinary charge by percentage would cover.

Discarding exceptional cases, it must be manifestly to the interest of client and architect to know approximately what the total remuneration payable is to be, whether the works are carried out or are designed, but subsequently abandoned for the convenience of the client. If no general scale is adopted, the alternative for the rank and file has been suggested of charging according to time employed. In that case, the man of more ready creative faculty, and possessing more ability, resulting from wide experience, who is able to grasp his subject at once, and get through his work quicker, would be entitled to receive *less* remuneration than the man who is of slower apprehension and less experience, but who, by the patient devotion of more time, may, for the sake of argument, produce the same result. Injustice is done, either in the former case to the architect, or, in the latter, to the client, whereas — the result being the same — a uniform remuneration in either case is, at all events, not unjust to the client.

Again, a difficulty would arise as to remuneration, if one architect did all the work with his own hands while another had draughtsmen to do the more mechanical work. The late Mr. G. E. Street, R. A., said he made every drawing for a very large building with his own hand. If so, judged by the standard of his position, his time was entitled to a high rate of remuneration, but, as much of the mechanical drawing could perhaps have been done equally well for practical purposes by paid assistants, the client would have suffered had he been charged on the basis of time occupied by the architect priced at its legitimate value, whereas by a percentage charge no injustice would have arisen.

Another question also comes in. Who is to fix the value of the architect's or his assistant's time? It is also possible to conceive that disputes could easily arise as to whether or not an architect had spent an excessive amount of time on any given work. This alone opens up a wide vista of litigation.

A further difficulty arises if time occupied is a basis for charge, as to how the architect is to charge for the sometimes long period of incubation which goes on in his mind by day and often by night, rendered sleepless by the difficulty of the problem. I am sure it is the experience of almost all architects that on important work this incubation runs through all one's time for days or weeks, until at last the design begins to take shape in the brain and is then transmitted to paper. It is practically impossible to say how much time is thus daily *solely* occupied on any given work, for the thread is running through all other work and occupation.

The fact is, that payment by time occupied in drawing fails as a basis, because it does not and cannot take into account that which is due to the higher creative faculties of the artist antecedently brought into play. It is for the benefit from these that the architect is employed.

It is sometimes said that the payment by percentage tends to make an architect spend more money than he would do otherwise. I do not believe the allegation to be true of any appreciable percentage of architects — first, because I believe architects as a class are honorable men; and, secondly, because nothing is more inimical to an architect's interest than to get known as an extravagant man. If he satisfies a client he may fairly expect that the client will both commend and recommend him. He then gains a friend, and his *clientèle* is increased. The policy, therefore, of uselessly spending a lot of money to gain a small extra remuneration on one's work would be so foolish that none but the shortest-sighted man would adopt it; and a man possessed of such a defect as short-sightedness would hardly be likely to succeed in his profession of architect, which eminently requires a man to look ahead.

If the result of charging by time be so variable and, as above shown, be unsound in principle, and if the basis of a proportionate charge be discarded, there appears to be no other way open than to bring each individual case to the arbitrament of a learned judge (as in the case cited) or of some other able expert. But it appears to me that such a method of settling the ordinary transactions of life is contrary to the universal principle of barter, is impracticable, and imposes too great a tax to make it a course which your lordship's views of justice and common-sense would commend.

I have no authority to speak for or on behalf of the Royal Institute of British Architects, but it may remove a misapprehension if I state that the scale (*i. e.*, the *rate*) of charges was not created by the Royal Institute. Great pains were taken by that body to ascertain what the usual practice was as to charges, and the printed form merely crystallizes and codifies the undoubted facts so ascertained. It is not improbable that the percentage system was by general consent adopted because the large body of merchants, brokers and others who form the bulk of employers were so familiar with that system in their regular business.

I think it may fairly be contended that it was well within the province of the chartered body of architects, not only to ascertain the facts, but to publish the result for the information not only of its members, but of all whom it might concern. The Institute does not impose its scale, even on its own members. The most that it does is to urge the desirability in the interests of employers and architects of following the *usual* scale (where no special agreement is made) so as (*a*) to prevent the pernicious habit of underbidding, which must lead to unscrupulous curtailment of the services properly due to the client, and (*b*) to insure uniformity of practice; and this is a principle sanctioned by the legislature in the remuneration of solicitors.

It shows but the loyalty of architects to the principle of just and equal treatment of clients, that in cases where a basis of payment has not been explicitly agreed on, and where an individual may have views legitimately differing in his favor from the recorded general practice, he is willing to waive his own opinion and to base his charges on those in the printed document. This is not always to his interest, for the scale sometimes gives a remuneration equal to that payable to a junior clerk, while on the average, even architects who have good practices only enjoy a modest competence, and the number of them of the widest practice who reap large incomes may almost be counted on the fingers, and is certainly far less than that in either the legal or medical professions.

I trust that in the foregoing I have been able to show that the balance of convenience to client and architect alike is in favor of the practice of proportional charging, and if I have, I trust your lordship may acknowledge that there is both wisdom and equity in the system, whether it be applied to buildings erected or to buildings only designed.

Apologizing for the length of this letter, I have the honor to be,

Yours truly, (Signed) EDWIN T. HALL.

JUDGES' LODGING, LEEDS, August 11, 1893.

Dear Sir, — I thank you for your full and elaborate paper on the subject of architects' charges which I have received here this morning. You will not expect me to do more than say that it has received, as it deserves, a very careful and attentive perusal.

I cannot pretend to enter into a full discussion of the subject with you; but I will repeat what I have already said, that I have never doubted the honor and integrity of architects, amongst whom I have the pleasure of numbering some of my oldest and most valued personal friends. I have the honor to be,

Your faithful servant,

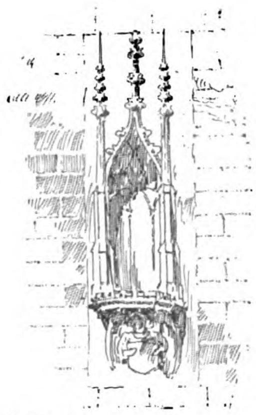
(Signed) COLERIDGE.

EDWIN T. HALL, ESQ.

A RUSSIAN BELL FOR NOTRE DAME DE PARIS. — A bell bigger than any now existing in France is to be cast in Russia for the Cathedral of Notre Dame de Paris. The cost of the gift will, it is said, be covered by a public subscription among the Muscovites, and Cardinal Richard has been asked, and has signified his willingness, to send an estimate of the weight which one of the towers of the cathedral will be able to bear. — *Invention.*

OLD SUBURBAN LONDON.

LAMBETH PALACE.



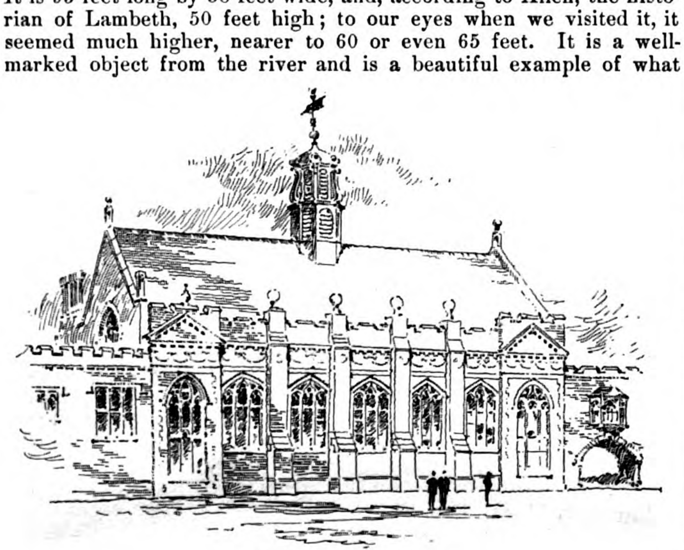
Niche on the Lollard's Tower formerly containing a Statue of Thomas a'Becket.

FEW of the relics of the past in or about London are more interesting than the old archiepiscopal palace of Lambeth. The parish, whose name seems to be a corruption of *Lamb-hythe*, forms part of the Hundred of Brixton, which in its turn was derived from *Brixi*, a Saxon thane whose estates stretched along the river and some distance inland. In the year 1042 these lands belonged to Goda, sister of Edward the Confessor, wife of Eustace, Earl of Boulogne, who presented them to the church of Rochester; with this commenced the connection of Lambeth with the ecclesiastical history of England. There can be no doubt of a Saxon residence having stood on this spot, and there is a local tradition that Hardicanute died here. A charter of Edward the Confessor in 1062 speaks of "Lambe-hithe with all fields, pastures, meadows, woods and waters thereto belonging." In the year 1197, Glanville, Bishop of Rochester, exchanged this manor for some lands in Kent, with Archbishop Hubert Walter. It then passed into the possession of the see of Canterbury, with the exception of a small part upon which a house was built for the use of the bishops of Rochester when they came to town to attend the meeting of Parliament or of Convocations; for many years this bore the name of Rochester Place.

The Saxon manor-house, or the greater part of it, was pulled down by Archbishop Boniface who, it is thought, began the present palace in the year 1244, but of his work there are few remains except the chapels. It was Archbishop Chicheley (or Chichele) who raised the characteristic pile known as the Lollard's Tower; the stone-built part nearest to St. Thomas's Hospital, also the old Banquetting Hall; he began his work in 1424 and expended large sums upon it. To this princely and munificent prelate, Oxford, it will be remembered, owes All Souls' College. His building operations were perhaps in some measure necessitated by the injuries inflicted upon the house some time before by the rebels under Wat Tyler, who plundered it, burnt many of the records and murdered Archbishop Sudbury.

Late in the fifteenth century and after the Wars of the Roses, the chair of Canterbury was filled by the famous Cardinal Morton, a great builder. He constructed the present Gate-house, one of the finest in England, and a very early example of that red brickwork which has played so large a part in our national architecture: its date is about 1490. In the troubles of the seventeenth century the great house fared badly. Under the Commonwealth it passed into the hands of Scott and Harding who utilized it as a prison for their opponents, pulled down Chichele's hall and sold the materials.

At the Restoration, Juxon, who succeeded to the archbishopric, found the entire fabric almost in ruins. He at once set himself to the task of restoration and to him London owes one of its most beautiful buildings, the great hall now used as the library. This noble room has been attributed to Wren, but the point is uncertain. It is 93 feet long by 38 feet wide, and, according to Allen, the historian of Lambeth, 50 feet high; to our eyes when we visited it, it seemed much higher, nearer to 60 or even 65 feet. It is a well-marked object from the river and is a beautiful example of what



Juxon's Hall, now Library.

has been called Oxford Gothic, that blending of mediæval with Renaissance forms of which there are so many charming examples at the old university city, with results which purists may criticise but which delight the visitors. It presents the appearance of a college-hall at Oxford and is not unlike that of the Middle Temple, compared to which it may be said that it is more beautiful externally though not quite so large. Red brick is the material employed, but with the addition of much white Portland stone which greatly enlivens it. Five great windows on either side are divided by bold buttresses terminating in stone balls; besides these at each end is an immense bay. The high-pitched roof is broken by a very large lantern surmounted by a beautiful vane composed of the arms of the see of Canterbury "impaling" Juxon. Internally, the first effect upon entering is exceedingly fine, though not in this aspect, equal to its neighbor at the Temple. The screen which once stood here has been removed and the conversion of the place into a library has marred, and that not a little, the sense of width and spaciousness. This, when it was used as a banquetting hall, must have been very apparent. One of those fine openwork roofs of timber which are unknown out of England — though it is singular that so beautiful an expedient never commended itself to the Continental builders — fills the vast dim space above the windows and may be sufficiently heavy to account for the external buttresses. Those who enter this lofty, admirably-proportioned room will remember that it was designed for the stately hospitality of the primates: the word "Hall" being synonymous at the Universities with dinner; the custom of publicly dining together which there prevails still surviving at the Temple and the other Inns of Court, with a "high table" across the upper end for the Benchers. At Lambeth the entertainments were on a great scale; two long tables ran down the length of the room; that on the right, headed by the steward was for the gentry; on the left, the almoner presided over the table allotted to the clergy; noblemen and privy councillors only sat at the archbishop's own table. After dinner alms and broken meat were distributed to the poor at the gate.

Juxon's Hall, the most important feature of the place, is now devoted to the library, a fine collection, both in print and manuscript, of books bearing upon ecclesiastical history and antiquities.

Londoners do not go to see their own "lions" and very few of those who pass this picturesque building are aware that the library is always open to the public from ten till four except on Saturdays, Tuesday afternoons and for a few weeks in September and October. It was founded by Archbishop Bancroft, who in 1610 left his books

Archbishop Morton's Gate-house, 15th Century.

Vane with Arms of Canterbury impaling Juxon.

for the purpose. During the civil wars they were in great danger but owed their preservation to no less a man than Selden who managed to get them conveyed to Cambridge where they were taken charge of by the University and remained until the Restoration, when they were restored to Lambeth. The collection was much increased by subsequent primates.

The books are arranged on shelves projecting at right angles to the walls, forming a series of bays, in the manner advocated by Mr. Gladstone as the most convenient, besides being more economical of space than the usual arrangement along the wall only.

Under glass cases are many precious remains of the past, of which we may mention, "*The Dictes and Sayings of the Philosophers*," translated from the French by Anthony Woodville (often written Wydville), Earl Rivers. It contains a fine illumination of an author presenting a book to King Edward IV; among the figures is that of the young prince, afterwards Edward V, who with his brother was barbarously murdered in the tower. It is asserted that this is the only likeness of him extant. According to Allen the author here represented is Caxton, but this is considered doubtful by Mr. Kershaw, the present Lambeth Librarian, the learned and judicious custodian of these treasures. One of Caxton's earliest books, however, printed in Westminster Abbey, is here, its date 1480; also the "*Chronicle of St. Alban's*" with beautiful illustrations, and many interesting mediæval books, those extraordinary examples of patient penmanship and brilliant illumination.

The bay-window at the northwestern end contains some interesting painted-glass, including a portrait of "Archbishop Chickeley."

Passing through a Jacobean doorway exactly opposite this window a small hall and staircase lead to the "Guard Chamber," a stately room 56 feet long by 27 feet wide, with a fine roof; it is panelled up to a certain height; above this hang the famous portraits of the archbishops. The oldest is that of "Arundel" painted, as an inscription upon it tells us, in the tenth year of the reign of Henry IV; the red rose of Lancaster is depicted in one corner. Next comes "Chickeley," on wood and represented in a kind of niche, its date 1414. The most celebrated is that of "Warham,"

the contemporary of Wolsey, who was archbishop of York: it is by Holbein and represents a rugged, singular and powerful face. The painter of Pole's likeness is unknown; it is a soft face with full brown beard. "The gentle Reginald Pole" as Macaulay calls him, is drawn in the red robe of a cardinal.

The able and excellent "Matthew Parker" does not shine in his portrait though it is the work of Richard Lyne, a man of some eminence in his day. From him we pass to "Laud," a most vigorous piece of painting by Vandyck and thence to the beautiful face of "Juxon," a wonderful portrait, but strange to say its artist is unknown. These are the best. Amongst the others may be mentioned "Archbishop Tenison" by Simon Dubois; "Herring" by Hogarth; "Hutton" by Hudson, the teacher of Sir Joshua Reynolds; "Secker" by Reynolds himself; "Moore" by Romney; "Manners-Sutton" by Sir Thomas Lawrence and "Howley" by Sir Martin Shee. It was this primate who christened Queen Victoria; crowned her uncle William IV; announced to her — at four o'clock in the morning of the 20th of June, 1837 — that she was Queen; crowned her in Westminster Abbey and married her to Prince Albert. The simple dignity of "Longley" will not be recalled by Richmond's portrait, which is as hard, uninteresting and expressionless as all his other works, and looking at its cold, pasty tones we are tempted to think that portraiture is a lost art, but our hopes are revived by Mr. Herkomer's likeness of the present archbishop, which is vigorous but has scarcely caught the expression.

Cardinal Pole's Gallery was originally a long corridor or succession of corridors running round a small court-yard and used as a library for many years, until in 1830, Archbishop Howley finding the house much in want of repair, pulled down a large part and rebuilt it. Two sides only were rebuilt of Pole's gallery and rebuilt in what can only be called "churchwarden's Gothic," the books at the same time being removed to their present position in the great hall. There are more portraits of archbishops here and an old view of London, but the only thing to remember is a small portrait of "Dr. Christopher Wren," father of the architect. He was Dean of Windsor and registrar of the order of the Garter and is represented, holding his own book with the names of the knights.

From this we pass into the most interesting part of the building: the Water-tower which is virtually the western part of the Lollard's tower; its name recalling the fact that the Thames once washed the walls of Lambeth Palace — the old, wide, shallow Thames of history with its *one* bridge and its far-spread marshes scarcely distinguishable from the river in times of flood or very high tides.

The chamber we now enter is called the "Post Room" from a wooden stanchion or pillar in the centre; it is of moderate size with a panelled ceiling. Small Gothic windows look upon the Thames; opposite them is a beautiful, deeply-moulded doorway, which seems to have been constructed during the transition from the Round to the Pointed style, the latter, however, predominating and divided vertically by a shaft of dark Purbeck marble. This is the entrance to the Chapel, but before visiting it a small low archway to the right claims our attention. It leads to the crypt and is associated with a terrible tragedy, for here Queen Anne Boleyn was brought and landing at the stairs at the foot of the tower and passing through a door in this room, long since built up, was taken down the little, dark, stone staircase into the crypt where the King's commissioners awaited her. With his usual craft Henry VIII endeavored to extort from her a confession that before her marriage with him she had entered into some kind of contract or betrothal to her cousin, Lord Percy. By a mixture of force and fraud, by terrorism and a promise that her life should be spared, the unhappy lady was driven into a statement that such a contract had existed. This was all that the packed court wanted. It enabled Henry to declare that his marriage with Anne had been invalid from the first. She was at once taken back to the tower and not many hours afterwards beheaded; her corpse was not yet cold before Henry married Jane Seymour. On a winter's day as we stand in the old Gothic room we catch through one opened casement a glimpse of the same wide rolling river that poor Anne Boleyn looked upon; it is only a glimpse and no modern object intrudes itself; entering this chamber we seem to have gone back into the past and Lambeth Palace is peopled once more with the men and women of English history.

Passing into the Chapel the first object that meets the eye is the stone sarcophagus in which reposed for many years the body of Matthew Parker. The chapel is 72 feet long by 25 feet wide and perhaps 35 feet high. It is a beautiful example in its details of a blending of periods and illustrates the principles upon which, in the great days of architecture, our ancestors invariably proceeded; each age building (or rebuilding when required) in *its own* style, and thus leaving an unmistakable record of itself; all the periods, too, being carefully harmonized with one another. Here the thirteenth-century windows of Boniface of Savoy seem in no way out of place with the rich Jacobean screen and simple but very pretty panelling of Laud. When he first came to Lambeth he found these windows "all diversely patched like a poor beggar's coat" and proceeded to repair them. "Lambeth" was destined to be fatal to him. The portrait we have mentioned fell down one day as he entered his room, an evil omen in the opinion of those times. His diary has been preserved at St. John's College, Oxford, and in it he tells us that on the day when he started for his trial, "As I went to my barge hundreds of my poor neighbours stood there and prayed for my safety and return to my house. For which I bless God and them."

The Chapel is curiously worked into the building and the organ-loft is really Archbishop Cranmer's *parloir* or sitting-room, a word still used in ecclesiastical buildings in France; there is also, high over the western end, a very curious arrangement, formerly a "hagiscope." The roof is vaulted and richly colored; this vaulting, however, dates only from Archbishop Howley and the color was applied in Archbishop Tait's time; Howley, therefore, removed Laud's ceiling as Laud had removed Boniface's. But Laud introduced a ceiling in the style of his own day — the late Jacobean; Howley, in 1830, acting under the influence of the Gothic *revival*, introduced vaulting which will suggest nothing to the traveller in future ages of the time in which it was built. It is possible that Boniface's work may have been vaulted; Howley's roof in that case representing the modern theory of restoration in *accordance with the supposed original design*, which has worked such disastrous results at St. Alban's Abbey. When an ancient building is taken in hand by people holding this view and "restored," all the landmarks of its history written upon its walls disappear and a dull, literal uniformity takes their place. It is fortunate that so much of Laud's beautiful work was allowed to remain and that the interior should be as effective as it is; amongst other features may be mentioned the floor, paved in alternate diamonds of black-and-white marble. There are other points of interest in Lambeth Palace; the Lollard's Tower, the gardens and the new buildings designed by Blore in 1830 and used as the modern residence of the archbishops, but we cannot speak of them to day. In the middle of the Chapel some Latin words are cut in one of the slabs of the pavements; they cover the mortal remains of the man to whom England owes the "Bishops' Bible."

Under the Commonwealth the sarcophagus which contained the body of Parker was broken open and "opening the leaden coffin and cutting away the cerecloths of which there were many folds, the flesh seemed very fresh." His corpse thus stripped was thrown on a dust heap. At the Restoration, Juxon caused the body to be reinterred in the Chapel with the simple words above it that "Here the body of Matthew the Archbishop at length rests in peace."

J. C. PAGET.

THE TEACHING OF THE INDUSTRIAL ARTS IN ITALY.

AN architect from the United States, who did me the honor to visit me in Milan, and whom I conducted through the Scuola Superiore d'Arte Applicata, remained quite impressed with this institution, not only on account of the manner in which it carried on its work, but from the picture which it gave him of the artistic movement in Italy; and he encouraged me to make all this the subject of an article in the *American Architect.* "Nothing exists in America," said my distinguished colleague, "like the School of Milan, and the manner in which such schools are graded among you is important to study." I have, therefore, to redeem a promise to him.

In truth, the system of education prevailing in the United States differs from European systems, and particularly from that of Italy. In America, where all institutions are founded by the people, for the people, there is no school or college in which are not found the sons or daughters of the working-classes. For these and other reasons the Americans have the preëminence in certain branches of mechanical industry, and occupy a high position in the arts and manufactures in which ability, invention and applied science are essential. Among you everywhere the positive and practical note prevails, and I recall with pleasure and admiration the "Workingmen's School" of New York, an institution unique in its way, which has a distant resemblance to our workshop schools, now condemned by the official director of artistico-industrial education.

Briefly, so far as I know, your industrial schools turn, generally speaking, rather to mechanical than artistic industries, and in their own sort are among the best in the world, both in their practical and well-directed teaching, and the richness of their material of instruction. I may cite the Spring Gardens Institute and the Girard College, of Philadelphia, the Massachusetts Institute of Technology, of which we in Italy have not even the idea, any more than we have of the Lowell School of Art, destined for the free teaching of design applied specially to textile industries. Among us, at present, exists an absolute division between the schools of "Arte e Mestieri," that is, those devoted to technical instruction, and those of applied art, which are restricted to industrial design. We have some of both kinds, and, curious to say, both sorts are of recent institution.

Until about 1870, Italy, in the field of industrial instruction, had done very little, and had obtained practically no good results, appearing to have falsified her own traditions. It is not necessary to be very learned in the history of the arts to know that in the period uniting the Middle Ages and the Renaissance, and more especially in the Renaissance period itself, Italy had over the other nations that superiority in artistic industries which, later, passed to France, England and Germany. At that time, the industrial products of Italy attracted the admiration of all European courts, and the most eminent artists did not disdain to become goldsmiths, makers of pottery or woodworkers; and the industrial arts were, for our fathers, the fountain of considerable gains.

Florence then traded with almost the entire world, exporting its silks, woolens and carved furniture; Siena, from the thirteenth

century was the cradle of Italian carving; Venice reflected in her productions the marvels of color and richness which belong specially to the character of the Oriental races, with whom she was in frequent contact; Genoa, "la Superba," the rival of Venice, disputed with her the commerce of the seas, and gained renown for her ornamented velvets; Murano monopolized the glass-maker's art, and its elegant blown wares rivalled the Oriental work; Gubbio, Faenza, Urbino and Pesaro filled the world with their marvellous pottery, and artists like Cellini, Caradosso, Maderno and Fontana worked in bronze, in a manner well known to you.

Italy, therefore, appeared to have given the lie to all this greatness, and to have become indifferent to the special aptitudes of her people. In this indifference and neglect the principal, and only too conspicuous part was played by the State; and he who knows how, among us, the State pushes itself to the head of every public undertaking, while the people, in consequence, grudges its coöperation, knows how to give its just importance to this fact, against which a general discontent was not slow to manifest itself. This is the reason that, previous to 1870, a few institutions for the teaching of the arts and industries arose in Italy through the initiative of industrial associations and private persons, who paid the expense of maintaining them. At last, in 1869, the Congress of Chambers of Commerce held in Genoa, recognizing the necessity for a more intimate union of science with labor, recorded its opinion that, by degrees, schools of industrial art should be established. Other expressions of opinion followed, in the same sense, and from these originated a movement, more direct and really effective, of the State in favor of such institutions. The Universal Exhibition at London, in 1851, which had opened the eyes of English industrials, and led to the foundation of the splendid Museum at Kensington, had not the influence over Italy that was exercised by the Paris Exposition of 1878, although the exhibition of 1851 did not leave the Italians entirely indifferent. But Italy had then its head full of the political movement which gave independence to the Peninsula, and its industries, after the great war of 1851, rested for a time as they were. The Paris Exposition, more even than the votes referred to above, made clear to the State the need of improving the instruction of workmen, at the same time that it showed the benefits which had already been derived from some of our existing industrial schools.

It was then that the Ministry of Commerce began to devote particular attention to the instruction of the working-classes — and in 1879, it invited Municipalities, Provinces and Chambers of Commerce to take steps toward the establishment of schools especially devoted to arts and manufactures, and to the arts applied to industry, promising the assistance of the State in founding and maintaining them. The amount of the subsidy to be paid was even fixed at two-fifths of the cost of scientific material and of maintenance.

To this invitation of the Government a praiseworthy response was given by Municipalities, Provinces, Chambers of Commerce, and Industrial Associations. Having always the Parliament standing with its favoring care ready to supply the necessary means, the schools grew rapidly in number and importance, until we now have more than one hundred and sixty institutions for teaching arts and manufactures, and applied art, whose purpose it is to furnish to working-people, including children and adults, notions of science and industrial design applicable to the professions which they exercise or to which they aspire.

But, within these general lines there is great variety, as much with respect to the materials of teaching as to the importance of the schools. There is no doubt of the practical propriety of the general principle governing all of them — that they ought to look before everything else, to the needs of the laboring and industrial classes of their respective districts, and adapt their instruction to this end. In this principle resides the opportunity for promoting the revival of those local industries to which the natural disposition of the several districts in which the schools are situated has shown itself best adapted.

The instruction in all these schools has taken an extension more or less great, and in some of them has assumed the character of a superior course, as, for example, in Rome, Florence, Milan and Naples, which either have museums attached to the schools, or enjoy the advantages of the museums and galleries of the respective cities. The schools of Milan and Naples have their own museums annexed; those of Rome and Florence do not. It is noteworthy that the union of the museum with the school of industrial art is, among us, considered not only useful, but indispensable, and, as we have seen, in Milan and Naples they form an indivisible whole, while as much attention is given to increasing the artistic collection as to improving the apparatus or library, if not more.

The actual workshop-practice being considered in Italy of little value in schools, such as exist at Rome or Naples, limiting myself to the principal schools devoted exclusively to artistic industry, it seems to me that the school of Milan unites, better than any other, the intellectual with the manual training. The Milan school is of the higher grade, and has an administration formed, as in other institutions, jointly, that is by the coöperation of the various contributory bodies, such as the State, the Province, the Municipality and the Chamber of Commerce. Its associated character comes from the fact that the school is an evening-school, and receives those who work by day in the factories, often applying directly what they learn in the school. Moreover the pupils are mostly adults, who, instead of being taken at random, have a definite profession in which they already possess considerable skill, as well as power of design, before they are admitted to the courses.

The school is divided into three sections — those of Architecture, Ornament and Sculpture (limited to decorative sculpture). From a most humble beginning, it has now an average of two hundred pupils, divided among the three sections, each of which has two courses; that of the copy, and that of the composition. The pupils are divided according to their regular professions, and are all working decorators, fresco-painters, stucco-workers, marble-workers, joiners, bronze-workers, designers of wall-papers or woven fabrics, blacksmiths or metal-workers, who complete the scholastic course indicated in from two to four years, according to individual aptitude. The school is free, and the pupils enjoy from the commencement of their course, with reasonable freedom, the use of the library and the very rich collection of photographs, which, like the books, may be consulted by any pupil, without special request, submitting only to certain precautions, necessary for the proper preservation of the scholastic patrimony.

This free use of the apparatus of instruction has given the results expected, and is therefore maintained, as is also the use of the collections of the Museum, any object in which, upon occasion, may be removed from the halls of public exhibition to the school-rooms.

I insist upon these particulars, because they seem to me characteristic, and useful to be known. The instruction, divided in the manner indicated, is rigorous, in that no pupil, either in the copying or the composition class, does any work not adapted to the profession which he exercises, and to his own preference.

Sometimes he selects for himself the subject of his copy or composition, which, after being approved by the instructor, who usually assists the pupil in his choice, and begins by making a sketch, for the purpose of training his eye and hand by that most useful exercise, freehand drawing. Quite frequently the subject is a photograph. Then the pupil makes both a sketch and a geometrical drawing. This cultivates his feeling for proportion, and initiates him into composition, the details being at the same time *carefully* studied. In the school it is not attempted to give a strict chronological instruction in the decorative styles, nor is any style excluded. Therefore one will find some pupils treating a mediæval subject, while others study a Pompeiian design, and others again take pleasure in the Japanese eccentricities now so much the fashion. In these matters the greatest liberty is given, as well as in the manner in which the drawings or compositions shall be rendered. As a rule, however, the Renaissance is preferred, partly as being the style most in vogue among us, and partly because it seems to be the style most *felt* by Italian artists; but, I repeat, if the Renaissance style prevails most in the Milan school, no style is excluded — not even the so-called "baroque."

The pupils pay no fees, and are provided gratuitously with paper and colors. They have the benefit of an unheard-of quantity of premiums and small travelling purses. They have no diploma (you know that we are not lavish of diplomas — that is, of privileges) and they are taken by their instructors to small places of artistic interest, from which, as it appears, they derive singular profit. They enjoy liberty and practical application in every part of their course, and it is perhaps for this reason that the Superior School of Milan made a very good impression upon one of your compatriots, whom I know to be an assiduous reader of the *American Architect.*

Perhaps another time I may write you of those Italian industrial schools where the scientific element is the principal one, as, for example, of the school for foremen masons of Milan, a school unique in Italy, and of some other institutions of the class of the School of Technology, of Boston. — Alfredo Melani.

ALPHEUS CAREY MORSE, F. A. I. A.

Providence, R. I., November 29, 1893.

ALPHEUS CAREY MORSE, F. A. I. A., born in Boston, Mass., June 3, 1818, died at his home in this city, Saturday, November 25, after such a brief illness that many had not missed him from his accustomed paths, and only learned of his death by the unlooked-for announcement in the public prints, at the ripe old age of three-score years and fifteen.

His gradually decreasing strength and the loss of elasticity in his step, together with the growing knowledge of his enfeebled health had given rise to anxiety on the part of his family and the large circle of attached and affectionate friends who, by these outward physical signs, alone, saw evidence of increasing age and a near approach to the border-land, and for that reason there was hesitation on our part in writing the word "old" in connection with his name.

Blessed with deep and strong affections, with a highly attuned and sensitive nature, overlying an artistic instinct that saturated his whole being, his gentle spirit found expression in conversation that reflected these lovely traits of his character and gave evidence of the breadth of his culture and the kindliness of his heart. Through the medium of the crayon in portraiture, and the pencil in architectural drawings executed with rare skill, he gave a further and more subtile expression of his artistic genius.

Mr. Morse, before coming to Providence, had prepared himself for the practice of architecture by service in the office of Alexander

Parish in Boston, and by study in Europe, where he resided for several years, a part of which time, at least, as companion and fellow student of the late Seth Cheney, who is remembered personally by but a few, but whose reputation is familiar to many. Under the influence of Mr. Cheney's advice and through his fellowship with artists in Italy, Mr. Morse was induced to devote much of his time to painting and to portraiture in crayon, and upon his return from Europe, devoted himself for a while to this work, but by the earnest wish of personal friends he was persuaded to move to Providence and was commissioned to undertake, as his first architectural work in Providence, the designing and superintending the erection of the residence of the late Thomas F. Hoppin, on the corner of Benefit and John Streets, to take the place of the Jenkins Mansion which was burned to the ground a few years before. This house stands to-day as an example of the very best work in Italian Renaissance, — a style in which Mr. Morse delighted to work, and in which he felt more at home than in any other, and from which he was seldom lured, no matter what style might, by passing fashion, prevail and obtain possession of the community.

The Rhode Island Hospital and Sayles Memorial Hall, both in a different style of architecture, and both of them designs of marked strength and purity, show that his power to design well was not limited to that style in which he felt most at home, and which appealed most strongly to his refined and cultivated taste.

Mr. Morse's high artistic ability and delicate appreciation of color made him much sought after as a designer of monumental work, as a director of decorations in color, and as a counsellor and adviser in many directions, by persons who had difficult problems to solve requiring the highest expression of art. He was also, in the latter years of his life, very frequently called upon by committees having large public projects in hand, as architectural adviser, and, at the suggestion and by the request of his fellows in the profession of architecture, he was often selected to act as judge in architectural competitions, both because of their high appreciation of his professional skill and because of the universal recognition of the eminent impartiality and fairness of his decisions.

Before coming to Providence Mr. Morse was associated with the late George Snell in designing the Boston Music Hall, and the color-scheme of the building, upon its completion, was, I believe, worked out by Mr. Morse and executed under his direct and almost constant personal supervision.

Mr. Morse's professional life in Providence covered about forty years of active service as an architect, and in all that period there has never been a time when he has not had some important private or public commission to execute, and we believe it will be difficult to find anywhere an instance where one has left behind him work of its kind of higher average excellence, and where can be found fewer examples that one might wish to change.

This slight sketch of Mr. Morse I hope to supplement at a later date with a more complete account of his life and his work, wherein I can do fuller justice to one whose death has deprived many of such a dear, warm and personal friend that one dare not trust himself to say all that he would of a life so pure and lovable.

He leaves a widow and two daughters to mourn him, but the sacredness of the family tie does not warrant us in drawing aside the veil and disclosing the charm of his life in its domestic relations.

A. S.

THE OPEN FIREPLACE AS A VENTILATOR.

UNIVERSALLY, the open fireplace is considered a good ventilator. General Morin says that in a room of twenty feet square and twelve feet high, with an open grate and "a good fire, the air would be removed four or five times an hour with a moderate draught of the chimney, and six or eight times with a blazing fire." Surely no better ventilation could be wished.

On the other hand, the *Encyclopædia Britannica* states: "An open fireplace, unless the air enters from the ceiling, often produces little or no ventilation above the level of the chimneypiece, and, even then, it does not afford the best and purest atmosphere. The air above may be comparatively stagnant, and offensive in the extreme from the products of combustion and respiration, while a fresh current moves along the floor to the fireplace."

For ventilation, three things are necessary — the introduction of pure air; the circulation of the air introduced; and the removal of the impure air. Each grate does the latter to some extent, but what of the former two? It is sometimes called the "lungs of the house" — but does it do all the required work? Whence comes the thirty thousand cubic feet of air General Morin says the grate removes each hour? When no other heating apparatus is used, this supply is "sucked in" from outdoors, or from adjoining rooms, through cracks around doors and windows. A common grate fire cannot burn in an air-tight room, and many fires smoke because the air-supply is not sufficient. But usually poor workmanship leaves openings enough and to spare. And so air enters, directly or indirectly, from outdoors, cold if direct, impure if through other rooms. Being cooler than that of the room to which it is drawn, the air falls to the floor, and this is that which the grate removes. The pure air is withdrawn, and the impure air remains nearly undisturbed, above and at the breathing line. This is not ventilation.

Suppose we have a furnace, sending warm pure air to the room in which the grate burns. Cold draughts are no longer necessary nor possible, and the heat is more evenly distributed, and, with all due respect to the *Encyclopædia Britannica*, perfect ventilation is secured. Entering at a higher temperature than the air in any part of the room, the fresh air will be at the ceiling, until by gradual cooling, and by pressure from the continuous incoming stream, it falls to the floor. It is breathed but once, as the downward motion is seen in all parts, but is strongest near the outer walls. Now the fire withdraws the impure air. When used in combination with an indirect heating-apparatus, or better still, when an attachment is made to the grate itself for indirect heating, the open fire is a most valuable and perfect apparatus for ventilation. In its original form, it, unaided, has no virtues other than the cheer of its blazing fire, and the beauty of trimmings.

J.

SOCIETIES

ENGINEERS' CLUB OF PHILADELPHIA.

AT the business meeting, November 18, 1893, President John Birkinbine in the chair, fifty-six members and visitors were present.

In opening the general discussion announced for the evening, on the subject of riveting, Mr. Wilfred Lewis referred to a number of letters received expressing interest in the subject, and read a letter from Mr. David Townsend stating that he was prepared for the manufacture of rivets to be driven cold, a number of which were exhibited.

In regard to the pressure required for driving such rivets, Mr. Lewis recalled some experiments made by William Sellers & Co., incorporated, between the compression platforms of their testing-machine. A number of ⅝-inch rivets were subjected to pressures between 10,000 and 60,000 pounds. At 10,000 pounds the rivet swelled and filled the hole without forming a head. At 20,000 pounds the head was formed and the plates were slightly pinched. At 30,000 pounds the rivet was well set. At 40,000 pounds the metal in the plate surrounding the rivet began to stretch, and the stretching became more and more apparent as the pressure was increased to 50,000 and 60,000 pounds. From these experiments the conclusion might be drawn that the pressure required for cold riveting was about 300,000 pounds per square inch of rivet section. In regard to the pressure for hot riveting, he said that until quite recently, within the last decade, there was never any call for a pressure exceeding 60,000 pounds, but that now pressures as high as 150,000 pounds were not uncommon, and even 300,000 pounds had been contemplated as desirable.

A letter from Mr. Henry G. Morse, President of the Edge Moor Bridge Works, was also read apropos of the discussion at the previous meeting on the strength of bolts as developed by long or short nuts.

Mr. F. H. Lewis. — I have never seen a riveter of any kind that can always be relied upon to drive the rivets tight. Even those having pressures of 75 tons sometimes drive rivets that are loose, and this is probably due to the buckling of the plates.

Mr. Henry G. Morris. — I have here an old sample which is intended to show that even the old toggle-joint riveter, if properly worked, will drive rivets that fill the holes even when they are badly matched.

Mr. Henry J. Hartley. — This is a question which is occupying a great deal of attention at present among bridge and boiler men, and I know that some series of tests to get at the facts are now being carried on. The necessary pressure must, of course, be enough to upset the bolt and form a head upon it; but this will vary with the fitting of the holes, the temperature and several other conditions. Books give little data on the subject, but I think the matter is of great importance, and would like to see it continued at another meeting, with the hope that more positive facts can be given. I, for one, will try to have something a little more definite. My personal opinion now is that machine-driven riveters do better work, and that the fault lies in the way that they are used, the riveter being generally run at one pressure, no matter what the diameter of the bolt and the thickness of the plates.

Mr. James Christie. — I remember many years ago in the West they used to drive boiler-rivets cold, but afterwards abandoned it on account of the deterioration in quality of the rivet iron.

Since critical systems of inspection and testing material have become common, the importance of having rivets solidly driven has been more thoroughly appreciated than formerly. Hand-work is avoided where possible, and higher pressures are used than before. Machines are preferred that will deliver the maximum pressure to the rivet with certainty. The direct hydraulic ram has the advantage of compactness, and when its fluid is stored in an accumulator there is a sudden impact or elevation of static pressure on the rivet at the termination of each stroke — a circumstance highly favorable to the riveting operation.

It has been found in girder-work, that for red-hot rivets of iron or soft steel, with length of grip not exceeding three diameters, a pressure of 50 tons per square inch of rivet section has been sufficient to completely fill the hole. Longer rivets require higher pressure, and

in extreme cases this pressure must be doubled to secure solidity. The shape of the head can be modified to a form favorable for the flow of metal into the body. The results of some experiments are submitted on the board, illustrating the advantage of high pressure on the riveted joint.

Upon motion, it was resolved to continue this discussion at the next meeting.

SKETCH-CLUB OF NEW YORK.

THE regular monthly meeting of the Club was held in the club-rooms on Saturday evening, December 2, about fifty members sitting down to dinner. Mr. Frank N. Doubleday, the speaker of the evening, gave an interesting address on French Illustrators, and distributed some photographs of the artists mentioned and a large number of excellent proofs of their work. Mr. John Galen Howard was also present as a guest of the club and criticised the designs submitted for last month's competition in rendering from a poetical quotation. First mention was awarded E. A. Josselyn, third to Emery Roth. Second mention unclaimed. During the business meeting that followed the addresses, an amendment was made to the constitution admitting women to Associate membership, with the privilege of entering the competitions and exhibitions. The second annual exhibition of the Club opened on this evening. This exhibition consisted principally of club competitive designs, class studies and club outing sketches from nature. About 275 drawings were hung, representing about 50 members. The exhibition remained open one week, with a ladies' reception Monday evening and a "smoke night" on Saturday, when the Kit-Kat Club of New York are received as guests. EDGAR A. JOSSELYN, *Recording Secretary.*

ILLUSTRATIONS

[*Contributors of drawings are requested to send also plans and a full and adequate description of the buildings, including a statement of cost.*]

HOUSE OF W. ALBERT SWASEY, ARCHITECT, ST. LOUIS, MO.

[Gelatine Print issued with the International and Imperial Editions only.]

DESIGN FOR A VILLAGE CHURCH. MR. CLARENCE R. WILLARD, ARCHITECT, HARVARD, MASS.

MATERIAL of structure is wood; the estimated cost, $12,000. In plan the auditorium is octagonal, with seating-capacity of about two hundred and fifty. Opening into the church is a Sunday-school room. There is also a library, pastor's room, ladies' parlor, and kitchen in basement, all heated by furnace.

THE THOMPSON LABORATORIES FOR WILLIAMS COLLEGE, WILLIAMSTOWN, MASS. MR. FRANCIS R. ALLEN, ARCHITECT, BOSTON, MASS.

SCRANTON ROW, ELMWOOD, PHILADELPHIA, PA. SKETCHED BY MR. FRANK A. HAYS, ARCHITECT, PHILADELPHIA, PA.

REFECTORY BUILDING, FRANKLIN PARK, BOSTON, MASS. MESSRS. HARTWELL & RICHARDSON, ARCHITECTS, BOSTON, MASS.

[Additional Illustrations in the International Edition.]

THE BASE OF THE OBELISK AND THE SOUTHWESTERN PAVILION OF THE AGRICULTURE BUILDING, WORLD'S COLUMBIAN EXHIBITION, JACKSON PARK, CHICAGO, ILL.

[Gelatine Print.]

HOUSES OF MESSRS. HENRY C. HULBERT AND JOSEPH H. SUTPHIN, NINTH AVENUE, BROOKLYN, N. Y. MR. MONTROSE W. MORRIS, ARCHITECT, NEW YORK, N. Y.

[Copper-plate Photogravure.]

ENTRANCE-HALL, ROLLESTON HALL, BURTON-ON-TRENT, STAFFORDSHIRE, ENG.

CONVENT OF SAN MARCOS, LEON — DETAIL OF FACADE.

THIS illustration is a reproduction from a drawing by Mr. A. N. Prentice, and corresponds with the fifth plate in his "*Renaissance Architecture and Ornament in Spain*," which Mr. Batsford has just published.

According to Mr. Prentice, the greater portion of the façade, which is the masterpiece of Juan de Badajos, was built between 1514 and 1549. Is is constructed of a rich yellow stone with a red tiled roof. The sculpture of the façade is supposed to be the work of Guillermo Doucel. The pilasters are varied in design, and no two capitals are alike. The large busts under the ground-floor windows represent emperors, knights of Santiago, etc., and, although now much mutilated, they might well be attributed to Berruguete.

DRESDEN, AFTER A DRAWING BY SAMUEL PROUT.

COMMUNICATIONS

[*The editors cannot pay attention to demands of correspondents who forget to give their names and addresses as guaranty of good faith; nor do they hold themselves responsible for opinions expressed by their correspondents.*]

CIRCULAR VS. ADVERTISEMENT.

BOSTON, MASS., November 29, 1893.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs, — A few weeks ago I received a circular, showing what seemed to me some admirable radiators for direct-indirect steam-heating — just what I have wanted many times within the last few years. The circular went at once into the waste-basket, where about half a bushel of similar ones go every day, not because they are not valuable, but because, even if I had room to store them, it would be utterly impossible to find any given one when wanted. Now I have an urgent demand for a good direct-indirect radiator, and cannot recall where to find the best that has yet come to my notice. Could you put me immediately on the track of these, if you recognize them from the description, and very much oblige,

Yours very truly, BOSTON.

[WE are human enough to rejoice mildly that this particular manufacturer seems likely to lose a customer by reason of his own irrational business methods. — EDS. AMERICAN ARCHITECT.]

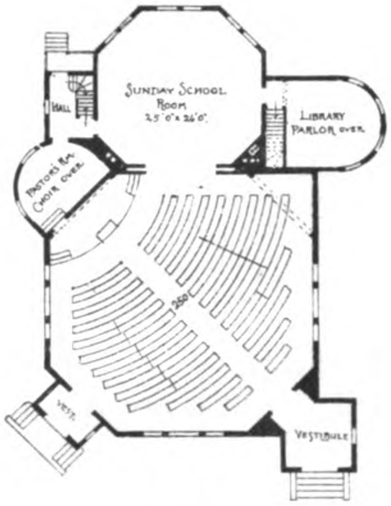
NOTES & CLIPPINGS

FIRE-RESISTING GLASS. — An interesting test of fire-resisting materials and construction was recently carried out in Berlin, under the auspices of the fire brigade and the insurance companies of the city. The idea of the tests was mooted as far back as 1889; but there was considerable difficulty in arranging for a series of "fires," which were intended to be as "natural" as possible, and yet should not be dangerous. Finally, the municipality gave the experimenters the use of an old warehouse for their purpose; and this building, having been fitted up to represent various types of fire-resisting structures, was duly set on fire. Care was taken to subject the exhibits to the temperatures, irregularities of heating, sudden shocks by falling weights or jets of water, etc., which generally occur at conflagrations; and it was found possible to take fairly exact observations. Among the most satisfactory results obtained were with the fire-resisting glass made by Messrs. Siemens, of Dresden. The assessors declare it to be most suitable for any skylight or window necessary in a division between separate risks, as it will resist a temperature of 1,300° C. for half an hour and more, bearing all manner of shocks and strains without suffering appreciable damage. Care is required in fixing this glass, however, as the iron frames generally used for the purpose buckle under heat, and show, between the glass and iron, openings through which flame can pass. Some of the so-called fireproof floors made of iron girders and concrete came to speedy grief in these tests; while iron and brick floors stood very well, as did the "Monier" construction (as to which reference has been already made in the *Journal*). As regards fireproof doors, nothing stood better than double oak covered with thin sheet-iron, between which and the wood there should be a layer of asbestos cloth. Seeing how many warehouse fires are propagated through windows, the assessors attach great importance to their demonstration of the capability of Siemens glass for withstanding flame. — *Scientific American.*

ELEVATING THE SAINTS IN ST. PAUL'S. — A curious sight may be witnessed any day in St. Paul's Cathedral just now, namely, the preparations for hoisting into position the colossal statues of saints and fathers of the church which are being placed in the eight niches round the drum of the dome in the interior of the church. To raise a block of stone weighing over a ton to a height of 135 feet above the pavement is no easy matter. Perilous-looking platforms resting on strong joists and supported by scaffolding poles at daring angles, which are marvels of skilful contruction, are erected across a narrow segment of the dome alongside the niche to be filled. The saint, divided into three pieces, each weighing over a ton, and carefully padded round to guard against any injury to the walls or railing of the Whispering Gallery as he ascends, is attached to a pulley composed of several thicknesses of rope, which, passing through a window high up in the dome, is raised or lowered by a windlass worked by four men in the stone gallery outside. St. Chrysostom was safely landed in his aerial niche about a year ago. St. Basil is already in position, but awaits the finishing touches of the sculptor, Mr. Woodington. St. Augustine of Hippo is now going up in sections, and a fourth father or doctor of the church is expected aloft before Christmas. The saints are riveted into the wall behind by iron clamps or stanchions, so that, as Canon Scott Holland told the workers and voluntary assistants of St. Paul's at their annual dinner on St. Paul's Day, nothing short of an earthquake could dislodge them. — *Westminster Gazette.*

S. J. PARKHILL & Co., Printers, Boston, U. S. A.

• A·VILLAGE CHURCH •
DESIGNED BY
CLARENCE A·WILLARD ·
HARVARD MASS •



· PLAN ·

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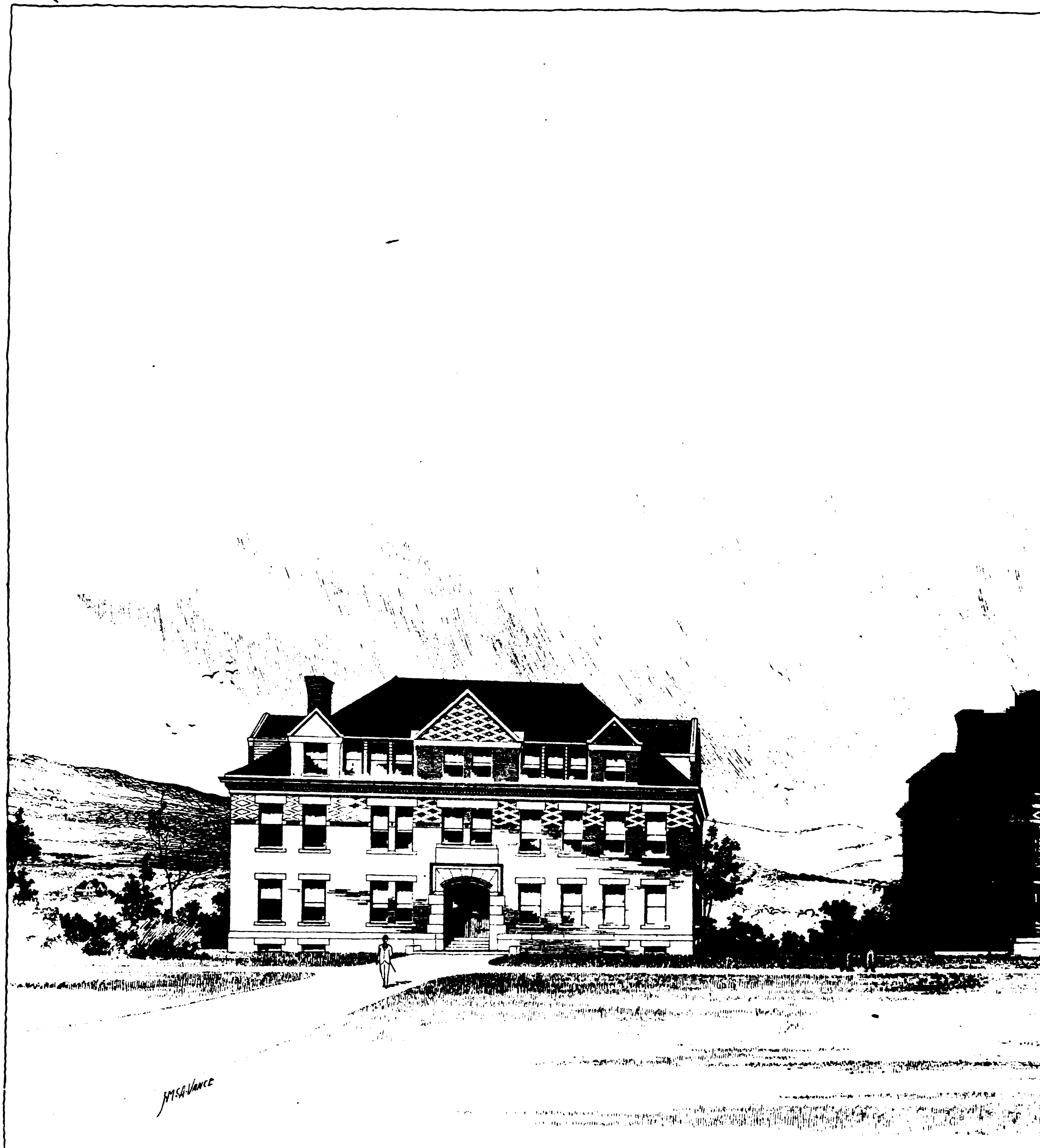

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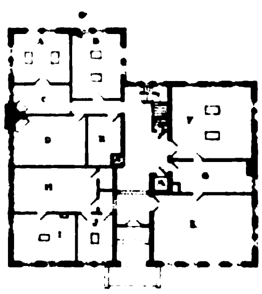
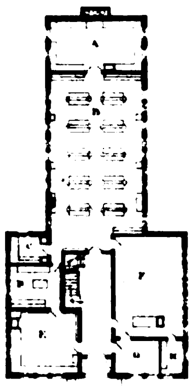


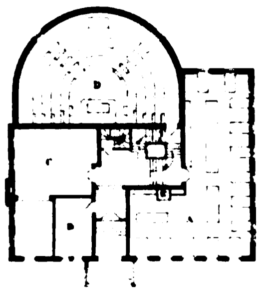
: PHYSICAL :

- A · PROFESSOR'S LABORATORY ·
- B · OPTICAL "
- F · ELECTRICAL "
- I · ASSISTANT'S "
- C OFFICE ·
- D LIBRARY ·
- E · STORE ROOM ·
- G · COAT "
- H CHEMICAL KITCHEN ·
- J PRECISION ·
- K · RECITATION ROOM ·
- M PENDULUM SHAFT
- N LIFT ·



CHEMICAL

- A HYDRIC SULPHIDE ROOM
- B QUALITATIVE LABORATORY
- F ASSISTANT'S "
- C REAGENT ROOM
- D STORE "
- G COAT "
- F RECITATION "
- H ORGANIC PREPARATION ·



BIOLOGICAL

- A JUNIOR LABORATORY
- B ASSISTANT'S ROOM ·
- C COLLECTION "
- D LECTURE "
- E LIFT ·

FIRST STORY PLANS

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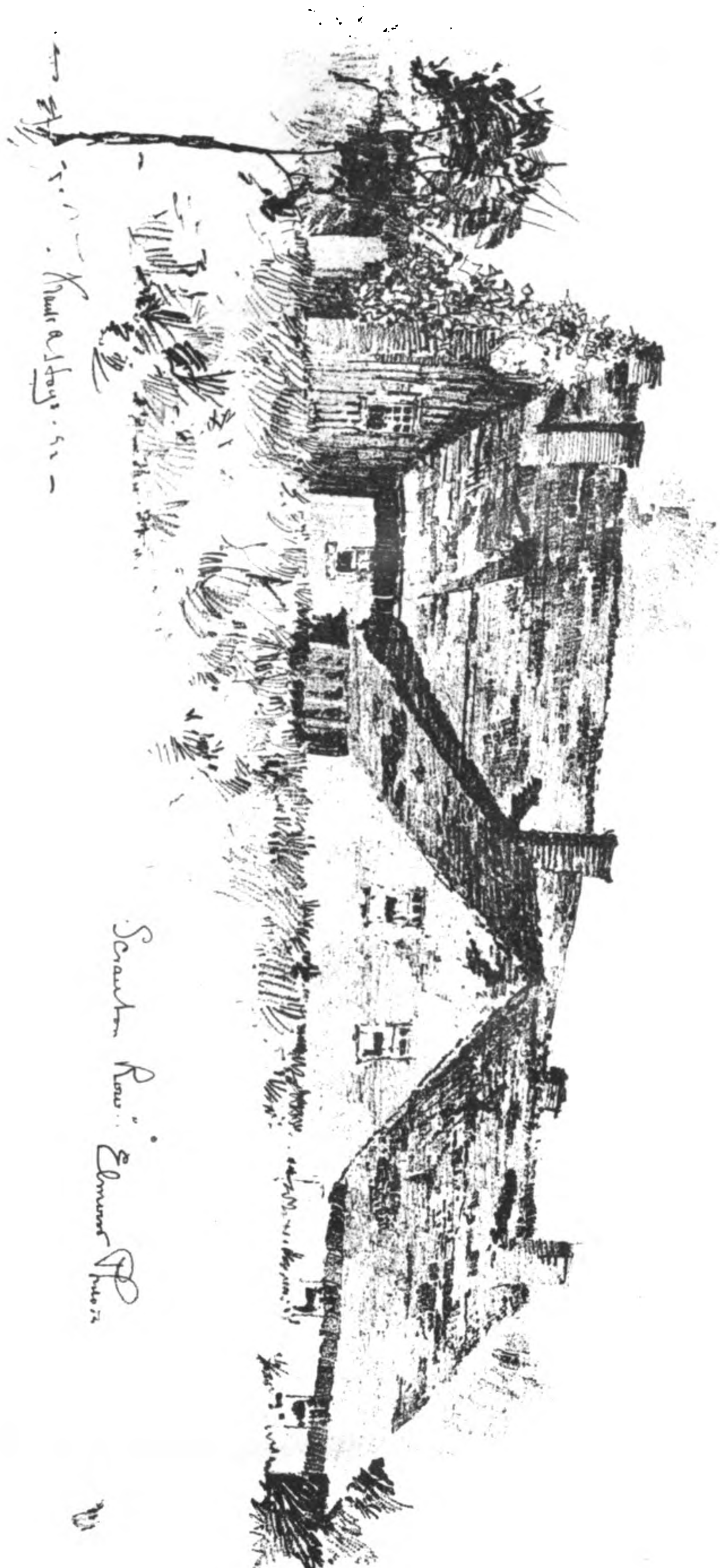

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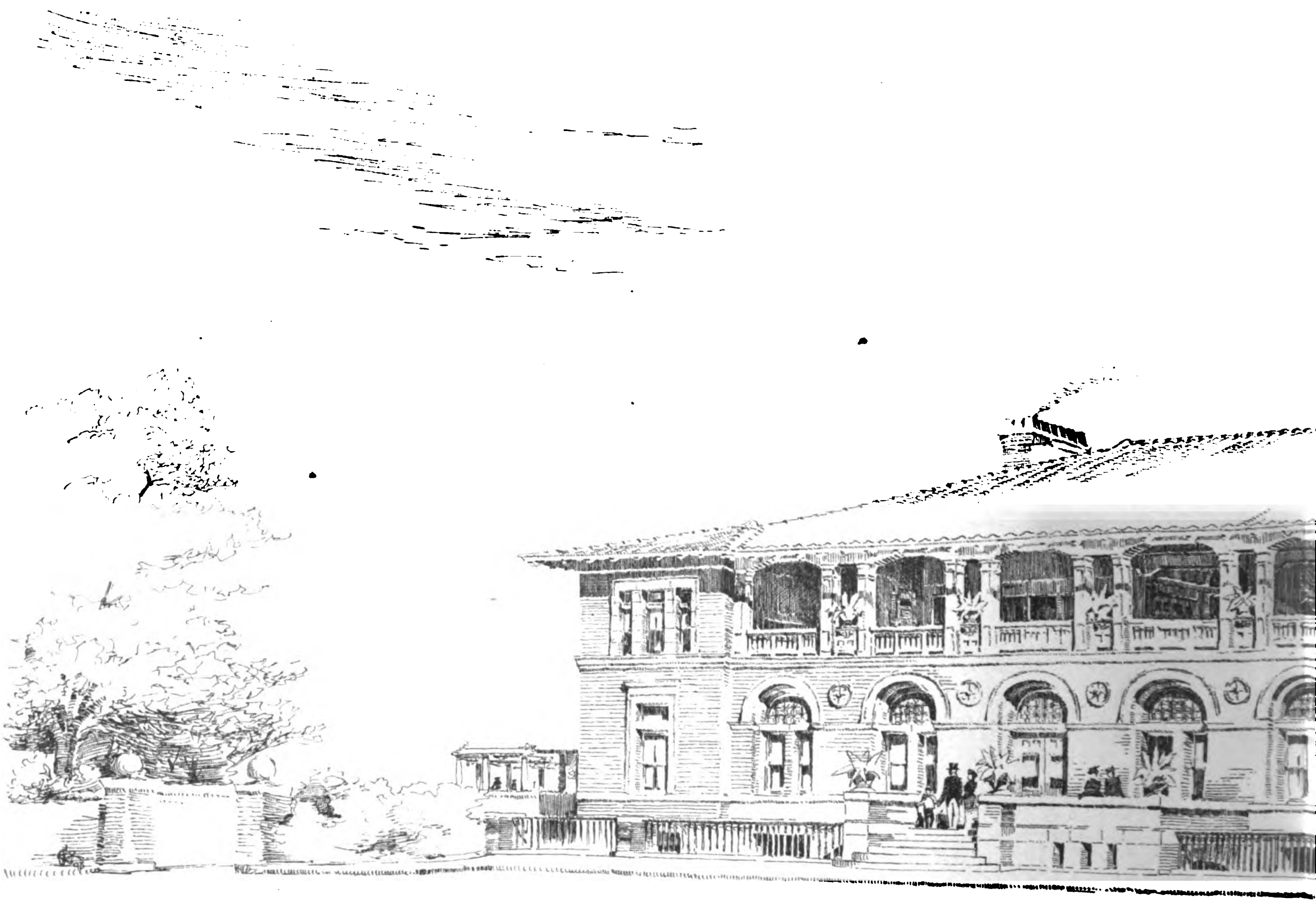

BUILDING NEWS. DEC. 9. 1893.
Y TICKNOR & CO

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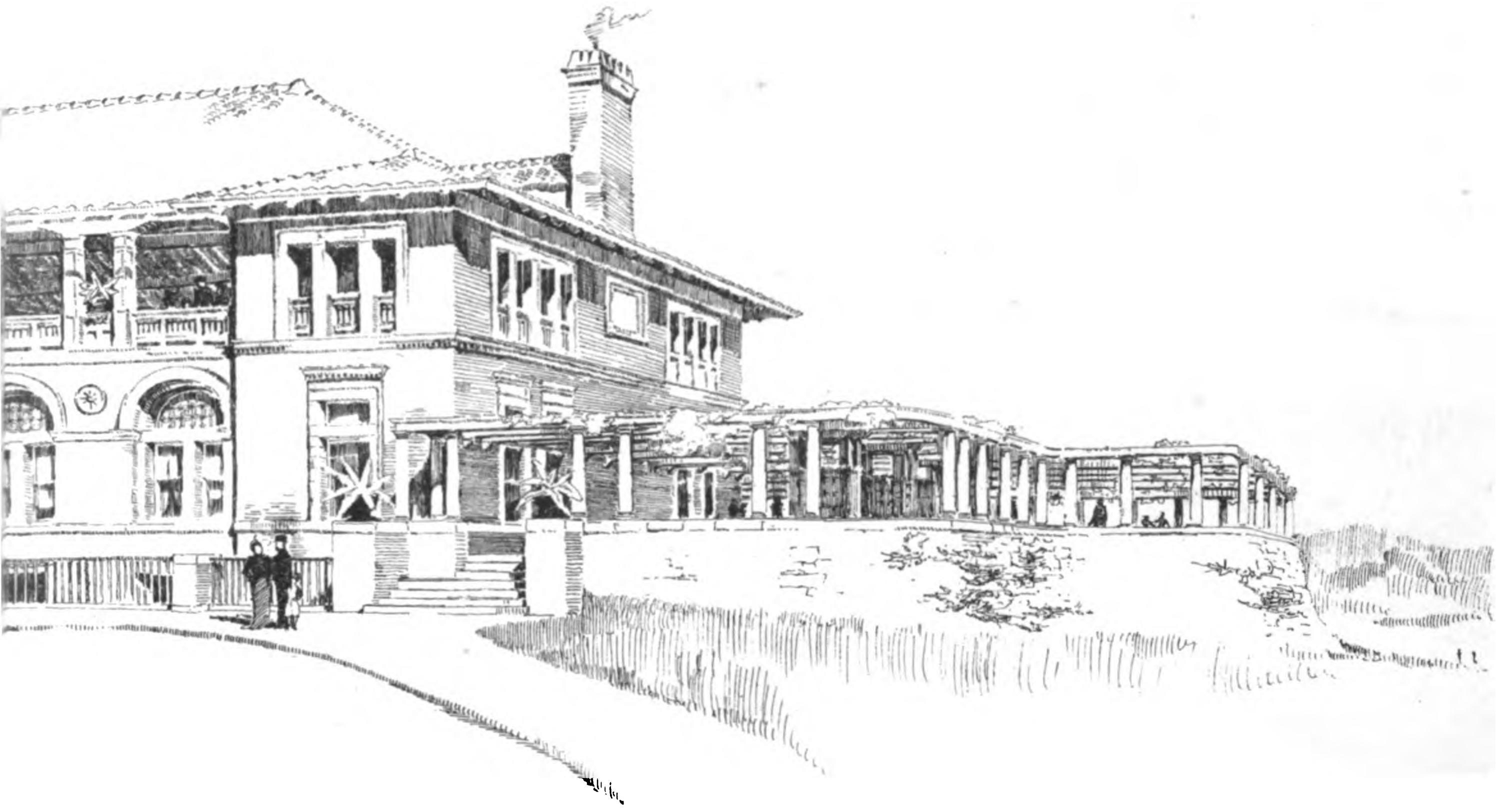

HELIOTYPE PRINTING CO. BOSTON

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DECEMBER 16, 1893.

CONTENTS

AS a sufficient number of the subscribers to the Regular and Imperial editions have already assented to the proposal made to them regarding an extra issue of illustrations of the World's Fair buildings, to make the scheme practicable, the offered illustrations will accordingly be issued to these special subscribers on December 23. Any persons who have forgotten to notify us of their desire to obtain these illustrations, which are well worth the price, $3.50, are requested to notify us to that effect without further loss of time.

THE *Engineering Record* has some remarks upon the value of tensile tests of neat cement, which, like all the editorial articles in that excellent journal, are worthy of attentive study, although we do not agree with the conclusions drawn in them. Speaking of the old-fashioned test of steel, where the test was made on a small rod, rolled specially for it, instead of on a piece cut from the ingot itself, it says that "almost precisely the same absurdity is being practised with the utmost assiduity in another field of construction," this field being that of masonry, where, as it says, cement specifications "continually insist upon the most exacting requirements in the testing of neat cement." It thinks, not without reason, that, as neat cement is practically never used in engineering masonry, and as it is notorious that some cements which test well neat do not show the same excellence where the briquettes are made with sand, it would be better to specify that the cement should show a given result with the same sort of sand, in the same proportion, that it is intended to use in the actual work. It says in summing up, "We do not wish to be understood as holding that the information derived from the tests of neat cement is not valuable and useful, for it certainly has some value, and is interesting, but we do insist that the decisive resistance test ought to be made with the mortar, and, further, with mortar made from the actual sand to be used in the work."

SO far as tests intended to guide the architect's or engineer's judgment of the cement are concerned, this view of the matter is unquestionably correct, and, in important work, tests of briquettes made with the sand intended to be used, and several sorts of cement otherwise approved, ought to be made, and probably would be; but it is hard to see how specifications could with advantage propose any given resistance of briquettes so made as the test to which the cement offered by contractors must conform. All cement dealers of any credit know what tensile strains their cements will endure neat, and can provide with certainty a material which will fulfil any reasonable demands of this sort, but to undertake to furnish cement which would show a given resistance when mixed with a given proportion of sand of which they know nothing, would be pure guesswork, unless the inconvenient process were gone through of sending samples of the sand to all the cement dealers, for special test. It would, of course, be comparatively easy to require a certain resistance with briquettes of a given proportion of cement and crushed quartz of specified fineness, but here the engineer, to determine whether the contract had been fulfilled, would have to supply himself with crushed quartz for testing, which would be inconvenient, and, after all, he would not know much more than before about the probable behavior of the cement and the actual sand to be used. Although, as the *Engineering Record* says, a cement which gives high results neat may give poor ones with sand, it is generally the case that such cements are badly ground, the coarser particles acting as a strong aggregate in the neat cement, while they count simply as sand where the cement is used for mortar. Obviously, the way to avoid such cements is to specify, not only the neat tensile strength, but the fineness, and this is what is usually done. Although certainty cannot be reached by this method, it has the great advantage that, if the requirements are not unreasonable, several brands can at once be offered by any dealer, any one of which can be supplied by the thousand barrels, if necessary, of a quality known to be uniform, and to fulfil the conditions both as to neat tensile strength and fineness, and the architect or engineer can, if he wishes, ascertain for himself which sort works best with the sand to be used in the work, and, under the present conditions of construction, we do not see how any better general test can be applied. The case is very different from that of steel testing, in that the examination of a three-quarter-inch rod, specially rolled from a given ingot, gives hardly any indication of the probable behavior of, say a huge eye-bar, forged from the same ingot, but, perhaps, differing greatly in texture, or uniformity of structure, from the skilfully prepared test-piece, while the tensile test of a briquette of neat cement, although it may not represent the conditions to which the cement will be subjected in the actual work, at least shows the quality, in this respect, of the whole barrel, or consignment, and the inferences drawn from the briquette test will generally hold good for all the cement of that brand.

THE New York *Times* is making an earnest struggle against the purchase by the Government, and the erection in Washington, of a group of statuary, by Turini, of New York, representing Columbus and Isabella. It seems that, several years ago a bill was passed by the Senate, appropriating seventy-five thousand dollars for the removal of the "Peace Monument," now standing in Pennsylvania Avenue at the foot of Capitol Hill, to some other place, and the substitution for it of a statue of "Columbus." It was then currently reported that Turini, whose title to fame appears to rest upon his rather unsuccessful statue of "Garibaldi," in Washington Square, had already modelled the "Columbus" statue which was to replace the "Peace Monument"; but the Senate bill was referred to the Library Committee of the House, which never returned it. More recently, a second attempt has been made to carry through what seems to have been the original scheme, by the introduction and passage in the House of a bill which does not mention the "Peace Monument," or an appropriation, but permits John Turini, of New York, to show his group of statuary at the Capitol. What would be the result of this exhibition, if the Senate should concur in the permission, it would be, of course, impossible to predict, but the *Times* thinks that some favorable opportunity will be seized to call up the original bill, which has already been passed by the Senate, and hurry it through the House, or in some other way secure the infliction upon the country of another of the second-rate pieces of sculpture which are already too numerous in Washington; and it begs Congressmen to be on the alert "to block any such game."

WHY Congressmen should vote to impose inferior works of art on the first city in the nation, it is impossible to conceive. The idea of their having any selfish interest in the matter is entirely inadmissible, except so far as the members from the district in which the favored artist resides may

have political debts to pay to his friends; and the only explanation seems to be that the other members are too good-natured to object to any suggestions that may be made to them in regard to such unimportant matters. If this is the case, it is certainly desirable that influential journals, like the *Times*, should unite in defence of the public, and it should be remembered that personal influence is very effective at Washington, and it might as well be exercised against, as in favor of, the reckless benevolence that squanders the people's money in encouraging engaging mediocrity. Fortunately, the present Congress, and, we hope, a good many Congresses to come, will think twice before appropriating seventy-five thousand dollars for anything as little needed as a new second-rate statue in Washington, and, by the time that the Treasury is in condition to encourage the fine art again, it is to be hoped that the public taste in regard to them, which is developing with extraordinary rapidity, will have advanced beyond the stage at which it mistakes gravestone images for sculpture.

FIRE AND WATER prints some information about fire-service abroad, which is not only interesting, but valuable to architects. It seems that Fire-Commissioner Murphy, of Massachusetts, was sent to Europe as a delegate to the recent International Convention of Firemen, and made many observations on points relating to his profession, some of which he described recently in an admirable address delivered before the Massachusetts State Firemen's Association. Like every other expert observer, Mr Murphy ascribes the immunity from destructive fires enjoyed by the great European cities to their solid construction, of incombustible materials, and to the subdivision of the space inclosed in them, which he justly considers the most important point of all. Contrasting London with an American city, he says that, out of the six hundred thousand buildings in London, there is not one constructed of wood, nor could he find one with an undivided floor-area of much over three thousand square feet. Moreover, the London buildings are low, and better protected in detail than ours, the electric wires in them, for example, being insulated and protected with extreme care. Comparing such a town as this with the older portions of New York and Boston, something like half the area of which, according to the insurance maps, is occupied by wooden buildings, while warehouses nine, ten or eleven stories high, with wooden beams and floors, often presenting an undivided floor-area of twenty thousand square feet or more, and crammed to the roof with inflammable goods, occur at frequent intervals all through the most crowded parts of the city, the wonder is not that American cities should suffer so much more from fire than those of Europe, but that the skill of the American firemen should be able to save anything from destruction. As to the effect of a large floor-area in increasing risk from fire, Mr. Murphy says emphatically that no matter how carefully a building may be constructed of iron and masonry, unless the floor-area is limited by numerous fireproof walls, the merchandise contained in the structure will alone make a large fire, and probably cause the building to collapse. This fact has been demonstrated over and over again, not only in Boston and New Yoık, but in Paris, London and Hamburg, where habitual security has led to an undue extension of the floor-limit in warehouses. Not often, therefore, having a destructive fire to deal with, the foreign firemen are far behind ours in quickness of action. Mr. Murphy says that a fire broke out in the royal palace in Rome not long ago. It was four hours before the engines arrived on the scene, and by that time the fire had burned itself out. In Paris, Mr. Murphy found what looked like an attempt to imitate the American system. There are only twelve steam fire-engines in all Paris, but, on going into one of the engine-houses, he discovered harnesses hanging from the ceiling, and the other conveniences for gaining time familiar here. A practice alarm was, however, given for his edification, and, he was somewhat astonished to see the firemen go into the stalls, and lead the horses out, and then lift down the harnesses from their hooks, carry them to the horses and put them on.

WHEN we cross Europe, and come to Asia, we come to a more familiar state of things, at least so far as construction is concerned. In the Japanese cities, as is well known, the walls of the houses are of bamboo, and the interior partitions of paper. Naturally, fires are frequent, and spread rapidly, but the houses are small and the damage soon repaired. It is related that a few years ago, an American resident, who had observed the operations of the native firemen, and compared them with the process of putting out a fire at home, thought it would be a good speculation to bring over an American hand fire-engine. He imported a small one, and had it taken to the next fire, which it summarily extinguished. Proud of the success of the machine, he proposed to the authorities that they should buy it, but, after some deliberation, his offer was rejected, on the ground, as he was officially informed, that if such machines should be brought into use, the carpenters would be deprived of the employment which they now found in rebuilding the houses destroyed. This novel view of the matter indicates that the rights of labor are well understood in Japan, and we commend the idea to the consideration of our trades-unions. There are possibilities of eloquence in the thought that the enslaved working-men of America are ground down under the iron heel of the insurance companies and concocters of building-laws, and in the alluring picture of the harvest of jobs which would follow the suppression, by dynamite perhaps, of fire-extinguishing apparatus, which should prove a mine of wealth to the labor orators, whose sources of inspiration have been running rather dry of late. If people should object to being burnt up in their dwellings for the sake of pleasing the Central Labor Unions, as it is conceivable that they might, another blow for the down-trodden might be got in at the expense of the public by a plan which is said to be followed in some Turkish towns. When a fire breaks out, the department immediately rushes to the spot, and there halts, while a colloquy is held with the owner of the premises, to determine how much he will pay for having the fire extinguished, and nothing is done until he comes to terms. It may be imagined that the varying circumstances of the conflagration, such as the approach of the flames to the room where his cash-box is hidden, or the screeching of his wives or children in the burning building, give an opportunity for effective bargaining with the proprietor such as only a walking-delegate could take full advantage of, and the enrolment of firemen among the Knights of Labor might, with judicious management, result in a transfer of cash to the pockets of those who directed their efforts, which would exceed even the profits to be derived from threatening the railroad companies.

THE Industrial Society of Copenhagen will hold in January, 1894, an exhibition of new inventions, including particularly those suitable for use in Denmark, Norway and Sweden. The Copenhagen Patent Office, a private corporation, which devotes itself to the sale of patents or patented articles, will coöperate with the Industrial Society in promoting the success of the exhibition. No charge will be made for space, or for motive power, but exhibitors must pay the expense of freight, packing and fitting-up. Application for space must be made before December 1, to the Industrial Society, Copenhagen.

THE Société Centrale of French architects has interposed in the affairs of the City of Paris, in a way which is, happily, getting to be not uncommon here, but is rare in France. It will be remembered that an underground railway is already in process of construction from the southern part of Paris to the centre, where a terminal station is to be built. The present plan is to set this station in the esplanade of the Invalides, and the Société Centrale has formally and energetically protested against the sacrifice of this "jewel of the national patrimony" to the exigencies of a railroad company. The protest says, with truth, that the open spaces in the central portion of Paris become more necessary as the city increases in extent, and that the esplanade of the Invalides, particularly, in connection with the superb planning of the streets which surround it and the church, form a grandiose composition, admired by the whole world, which should not be intruded upon for a purpose which could just as well be carried out by other means. It will be interesting to learn whether the Government pays any attention to this remonstrance. While the French authorities regard artistic proprieties with far more respect than ours do, they are not very much disposed to take other people's advice in regard to them, and the Société Centrale will be fortunate if it carries its point.

ARCHITECT, OWNER & BUILDER BEFORE THE LAW.[1] — XXXII.

HOW CONTRACTS MAY BE MODIFIED.

WHILE a contract, once entered into, will be enforced by the courts, if necessary, with a strictness which sometimes unpleasantly surprises builders of the easy-going sort, there are various ways in which the persons who have made the agreement can, by mutual accord, set it aside, or modify it. In general, the methods by which a contract may be modified, or wholly or partially annulled, may be divided

AGREEMENT OR WAIVER.

into two, agreement, and waiver. By the first method, the change to be made is considered by the parties to the contract, either at the time of making the contract, or subsequently, and provision made for the change by mutual understanding. In very many cases, the original contract contains provisions for the modifications that are likely to be made, such as additions to, or deductions from, the work to be done, extension of time of completion, and so on; but if it does not contain such

SUPPLEMENTARY AGREEMENTS.

provisions, supplementary agreements may be made, in modification of the original contract, which will have equal force with it, and will be interpreted in connection with it. It is held by most courts that an agreement in modification of a contract may be verbal, and will still be valid, even though the original agreement was in writing, unless the original contract expressly provides that no modification shall be made except in writing; but there are exceptions to this. For example,

CHANGES IN CONTRACTS WITH CORPORATIONS.

the rules applying to the validity of contracts with corporations, which were described in their appropriate chapter, apply equally to any modification of such contracts, and those who are interested in such agreements should see, if any modifications are to be made in them, that the changes are made with the necessary formality, or they may suffer for

CONTRACTS UNDER SEAL.

their carelessness. In the case[2] of contracts under seal, also, a special rule is followed by some courts, which say that, "while a simple contract reduced to writing may be varied or changed in any way by a subsequent verbal agreement, it is otherwise as to contracts under seal, which cannot be varied by a mere parol contract, whether in writing or not, since such a contract is inferior to the original." The origin of this distinction is probably to be found in the idea that a sealed document expresses stipulations entered into with such extreme solemnity and care that they should not be allowed to be set aside by the less deeply pondered conclusions of an ordinary agreement; but, as contracts with corporations are almost always under seal, and those with private individuals are very frequently so, the point should be borne in mind. In practice, the distinction appears to be a technical one, but even a technical mistake in the conduct of a lawsuit may cost an honest claimant a large sum. A man once contracted under seal[3] to build two houses for the defendant, and to have them ready on a certain day, for five hundred pounds. The evidence showed that the parties, by a parol agreement, had extended the time of completion, and the houses were completed within the extended time, though not within the time originally set. The contractor sued for the contract price, alleging fulfilment of his agreement. His counsel was too good a lawyer to claim that the parol agreement could vary the terms of the sealed contract, but he argued that it was such evidence of performance that the defendant was estopped to say that there had not been substantial performance, within the terms of the original agreement. The court, however, held that there was no performance, and that the evidence did not support the declaration. In a somewhat similar case,[4] which was also decided against the claimant, on technical grounds, Lord Kenyon said that the parol agreement might be sufficient whereon to found an action of assumpsit, but it could not be the foundation of an action on a covenant under seal, whereby the parties had bound themselves to perform a different contract.

So in this country, where it has been held that "A contract[5] sealed cannot be rescinded or released by a parol agreement." In Illinois, however, it has been decided that a contract, even under seal, may be changed by a subsequent verbal agreement to pay an additional sum for the same work and materials mentioned in the original, and the written contract[6] will then remain in force, except as to the price to be paid; and if the work is done under the same, it will be binding.

IMPLIED AGREEMENTS FOR CHANGES.

In cases of the ordinary sort, the question whether there was any actual agreement between the parties to modify the original contract is often an important one. As we have seen, an agreement may be implied, so that a man may be held as strictly to a bargain to which his assent can be inferred only from his acts, as if he had written out its terms and signed them, provided that his acts give unmistakable evidence of his intention, and that the other party has not agreed that no bargain between them shall be valid unless expressed in writing.

Even such an agreement may not wholly exclude the validity of verbal or implied modifications of an existing contract. In a Massachusetts case,[7] where a written contract for building said that extra work should only be paid for if executed in accordance with a written order, and the builder sued for payment for work done on merely verbal orders, the Supreme Court said that "Attempts of parties to tie up by "contract their freedom of dealing with each other are futile." "The contract is a fact to be taken into account in interpret-"ing the subsequent conduct of the plaintiff and defendant, "no doubt, but it cannot be assumed, as a matter of law, that "the contract governed all that was done until it was re-"nounced in so many words, because the parties had a right to "renounce it in any way, and by any modes of expression "they saw fit." In this case, most of the extra work was done after the completion of the original contract, and, in regard to that which was done before the completion of the main contract, and which consisted in building drains, it was proved that the defendant asked the plaintiff to build the drains, and promised to pay for them; so that the question before the court was not whether the proviso of the original contract, requiring written orders for extra work, should be disregarded, so much as whether the stipulation should be considered as extending over subsequent and independent work, which was not thought of when the original contract was made.

In a Nevada case,[8] the evident intention of the parties has been permitted to overrule the written agreement on another ground. In a contract between a building-committee and a builder, it was stipulated that changes might be made from the plans, "on request of the building-committee, provided the extra price, or deduction in price, for the same is mutually, or by arbitration, agreed upon before such a change is made." Changes were ordered and made, but the price for them was not agreed upon as the contract required. The evidence showed that the contractors were willing to agree upon a price, and urged the building-committee to fix it, but the committee refused, continuing, however, to order changes. The Court held that this conduct amounted to a waiver of the clause inserted in the contract for the owners' benefit.

The United States Courts[9] hold a similar doctrine. In a suit against the Government, to recover pay for extra work, where the contract provided that no claim should be made for extra work unless first agreed upon in writing, it was held by the Court of Claims that such a clause did not bind the parties, so as to avoid a transaction implying a verbal agreement for extra work, but that it was inserted in Government contracts merely to limit the powers of architects and superintendents. The judge said, "Courts cannot transmute a contract into a "statute of frauds, nor attach to the agreement of the parties the "irrevocable mandatory attributes of a statutory provision." . . . "A provision in a written contract declaring that no claim for "extra work shall be made unless it was required and agreed "upon in writing is merely a condition, which may be waived "by subsequent oral agreement." The Court said further,

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[1] Continued from No. 905, page 63.
[2] Sherwin *vs.* Rut. & Bur. R. R., 24 Vt. 347. Porter *vs.* Stewart, 2 Aiken, 417. Little *vs.* Holland, 3 T. R. 590. Phillips *vs.* Rose, 8 Johns. 393.
[3] Little *vs.* Holland, 3 T. R. 590.
[4] Heard *vs.* Wadham, 1 East, 619.
[5] Delacroix *vs.* Bulkley, 13 Wend. 71.
[6] Cooke *vs.* Murphy, 70 Ill. 96.
[7] Bartlett *vs.* Stanchfield, 148 Mass. 394. *See also*, West *vs.* Platt, 127 Mass. 367-72; O'Donnell *vs.* Clinton, 145 Mass. 461-3.
[8] Truckee Lodge *vs.* Wood, 14 Nevada, 293.
[9] Ford *vs.* U. S., 17 Ct. Cl. 60. *See also*, Rude *vs.* Mitchell, 97 Mo. 365.

"Where a public agent requests a departure from an express "contract, and the change ordered is of such a nature that "he may reasonably suppose that no additional expense "will be caused thereby, the contractor is bound to speak, or "he will be deemed to have consented to make the substitu-"tion at the contract rate. But where the change is of such a "nature that it must necessarily involve additional cost, no "such notification is necessary, and the contractor will recover "reasonable compensation."

It would, however, be dangerous to assume that the ordinary contract clause, declaring that no claims for variations shall be valid unless the work was ordered in writing, or unless the price has been previously agreed upon, can with impunity be disregarded. Scores of cases[1] show that where the two parties have really intended that a formal order shall be given and accepted, in any manner that they choose to specify, for work to be considered as extra, and have expressed their intention in the form of a contract, the courts will give effect to their intention, no matter how anxious one of the parties may be, later, to escape from his agreement; and it is to be remembered that a written stipulation of this sort will be preferred to any verbal understanding or conversation that might modify its effect, and even to another, but less definite clause in the same contract, which would seem to contradict it. As an example of the strictness with which a written stipulation is enforced by courts, in disregard of verbal additions or explanations, a New York case[2] is instructive. A written contract was made to deliver stone, "to be of the sizes and qualities such as the engineer in charge of the work shall approve." This contract was made with certain stonecutters, and at the time of making the agreement the quarrymen, who were the plaintiffs in the case, showed the defendants a large quantity of stone in the yard, and at the quarry, saying that this stone was a sample of the stone they would supply. The stone actually delivered, however, was inferior in quality to that shown, and cost much more to work, and the stonecutters refused to pay for it, although it was approved by the engineer. The quarrymen sued for the price, and the stonecutters, in their defence, endeavored to show that the stone furnished was not according to sample, and had cost more to work. Three successive courts, including the Court of Appeals, excluded this evidence, and gave judgment for the plaintiffs, the Court of Appeals saying that "The written con-"tract between the parties must be regarded as containing the "whole of their agreement upon the subject-matter thereof, "and as merging therein all prior and contemporaneous con-"versations, stipulations and negotiations in relation thereto," and that parol evidence tending to show that the stone was to be like a certain sample, while the written contract said that it was to be such as the engineer approved, must be excluded.

In another case,[3] where the written contract said that extra work was not to be paid for unless ordered in writing, and containing another clause, saying that "the engineer may direct alterations in, and additions to, the work," it was held that the latter clause was not to be construed as affecting the validity of the former one; and, where a contract provided that work should only be paid for as extra, if executed in accordance with a written order,[4] a New York court even refused to admit evidence showing that the work had been done, unless the written order for it was at the same time produced.

EXTRA WORK IN EMERGENCIES.

Even where the contract contains a stipulation that variations or additions shall only be made in accordance with written orders or agreements, it seems to be the case, however, that in cases of emergency the architect or engineer may cause extra work to be done, to the extent necessary for the safety of the building, and that the owner can be required to pay for it. A bridge was once built in Indiana, by written contract,[5] under the supervision of a superintendent appointed by the County Commissioners. After the signing of the contract, the superintendent required the work to be done in a manner which made necessary more masonwork, and more filling, than was contemplated by the original contract. The Commissioners refused to pay for this additional work, on the ground that it was done voluntarily by the contractor, and that the county could only be bound by contract made with the Board. The contractor sued, and the case was carried to the Supreme Court. The Court, after examining the statute providing for the erection and repair of bridges, which said that "For the erection of any such bridge, the said Board shall appoint one or more discreet persons as superintendents thereof," and provided further, that such superintendents should receive proposals, and let contracts to the lowest responsible bidders, and require surety for the due performance of the contract, said, "It is thus seen that the superintendent has power to let con-"tracts for the construction of bridges, and to superintend the "work. We think that this makes the superintendent the "agent of the county for the purpose of the construction of "the bridge or bridges, and that he may bind the county by "requiring work to be done beyond that contemplated by the "contract. Such authority in the superintendent is necessary "for the county, in order that the structure may turn out to be "substantial and lasting; and it is proper, in order that the "contractor employed to perform the extra work may have a "remedy therefor. If it should be foreseen by the superin-"tendent, after the letting of the contract, that the work per-"formed or contemplated by it would be insufficient or defect-"ive, the county might be greatly the loser if he could not "require such additional work as would make it substantial "and permanent, and bind the county therefor."

So in New Jersey, where a contract[6] had been made for building a tunnel, and extra work was found necessary, it was held that the contractor must be allowed payment for it.

Great caution is, however, necessary in any attempt to take advantage of this principle. As we have already seen, the courts hold that an architect has no authority to order changes or additions, unless the contract expressly gives him that authority, and an order given by him, without such authority, for work necessary in emergency to prevent injury to the building, if allowed at all, would probably be so on the ground that an architect is the agent of the owner for seeing that his building is carried out properly, and according to his wishes, and that, in this capacity, he is authorized to take such steps as may be necessary, in emergency, to save his employer from loss, whether the contract expressly gives him such authority or not.

VERBAL ORDERS FOR EXTRAS.

In practice, it very frequently happens that, notwithstanding any stipulation in the contract that orders for variations which either increase or diminish the cost of the work shall be valid only if given in writing, the owner, as his building assumes shape, or his intentions with regard to it undergo change, orders various alterations verbally, without waiting for the more tedious process of writing out the order, or agreeing upon a price for the change, and is honest enough to pay for the work so ordered, without endeavoring to escape liability on the ground that the orders were not given as provided in the contract. Even where no verbal orders have been given, an order may be implied from the conduct of the owner, and orders of this sort are much more likely to be inferred, if he has already waived the contract stipulations in some other way. Such looseness in dealing with a contract is objectionable, as a waiver of the written agreement in one case opens the door for claims on the part of the contractor to be paid for following all sorts of innocent suggestions from the owner; but, if the parties, after abandoning their own agreement, fall into dispute, the courts will deal fairly between them. The principle governing such cases is well stated in a decision[7] of the United States Circuit Court, which held that "Extra work done on houses built by contract in writing cannot be recovered for, unless there was a separate contract between the parties that such extra work should be done by the builder, and paid for by the owner, or unless the owner, while the houses were building, requested the builder to do the extra work, knowing that it was not comprehended in the written contract, and that the cost of the houses would be thereby increased. The mere circumstance of the owner's knowing that the extra work was doing, and not objecting to it, does not raise a contract on his part to pay for it; but is evidence which may be given to the jury, tending to prove that there was an agreement that the extra work should be paid for by the owner."

It is to be observed, moreover, that where the written contract requires orders in writing for variations, if the owner

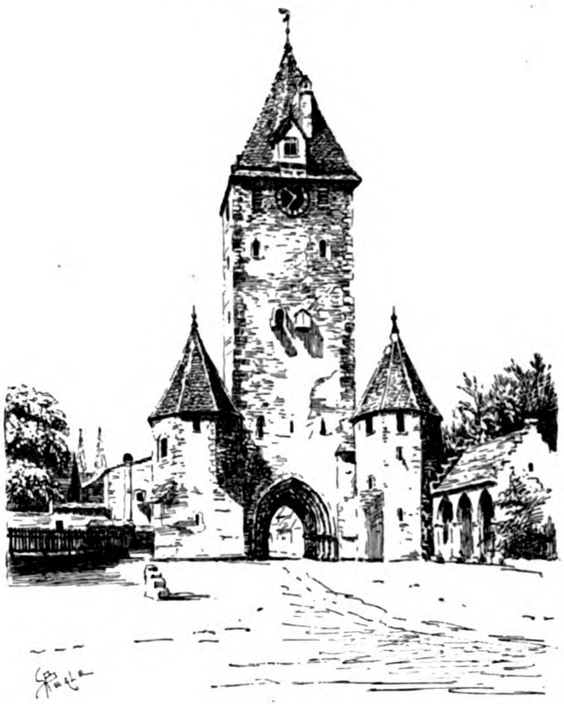
[1] Trustees *vs.* Platt, 5 Bradw. 567. Condon *vs.* Jersey City, 14 Vr. 452.
[2] Thomas *vs.* Hunt, N. Y. App. Sept., 1867.
[3] White *vs.* S. R. R. R., 50 Cal. 417. Trustees *vs.* Platt, 5 Bradw. 567.
[4] Sutherland *vs.* Morris, 45 Hun. 259.
[5] Board *vs.* Byrne, 67 Ind. 21.
[6] Seymour *vs.* Long Dock Co., 5 C. E. Gr. 397.
[7] Belt *vs.* Cook's etc., 3 Cranch, 666.

chooses at one time to give verbal orders for extra work, he cannot afterwards insist that subsequent verbal orders are invalid. Although verbal orders are sometimes hurriedly given, as occasion demands, and as soon as practicable afterwards ratified by a written order, so as to bring them within the strict intention of the contract, without, probably, exposing the owner to the presumption of having intended to waive the contract stipulation, it would obviously be unjust to allow an owner to give verbal orders for various things, and then claim that some of these orders were valid, while others were invalid, as conflicting with the condition of the contract. This point has been covered by a New York decision,[1] which says, "A written contract may be waived, either in whole or part, by parol, and after it has been thus waived by one of the parties, neither he nor any one acting under him can reinstate it."

[To be continued.]

[1] Wood *vs.* Perry, 1 Barb. 114.

REGENSBURG. — I.



The Ostenthor.

A CITY which contains some early Romanesque churches and a cathedral more beautiful in many respects, and certainly far more interesting than Cologne's; a city which still retains a large portion of its old wall and moat, and most of its watch-towers; a city whose town-hall is little changed from the times of the old Kaisers, and whose dungeons are still in so perfect a condition that the municipality could revert to the ways of their ancestors and torture their fellow-citizens unknown to the rest of the world; such a city cannot fail to be attractive in the highest degree to all lovers of art and archæology.

Regensburg was colonized by the Romans, and the discovery in 1885 of the remains of some baths at a little distance from the Ostenthor (Porta principalis dextra) seems to prove that it was occupied by them as early as the reign of Domitian; but it was a century later that the town became a military stronghold, Castra Regina or Reginum. The probable boundary of the Roman town passed from the Portra prætoria (the river gate), through the Ostenthor, round by the Taxis-strasse, the Petersthor, Bachstrasse, and Wahlenstrasse, (Wallerstrasse, Wallgang, Wall — Vallum). The Porta prætoria was discovered in 1885, the Bischofshof having been built on to it. The arch of the gateway consists of thirteen roughly-hewn stones, one metre long and ninety centimetres broad. On the east side is a tower of two stories, and on the west, the foundations of another.

But it is the Mediæval town which fascinates the artist; the narrow streets with high-pitched roofs and battlemented walls, the bay-windows, the tall square towers, with loop-holes in the walls, the quaint old inns with their wrought-iron signs, and the remains of innumerable convents.

Reganesburg, Ragenaburg, Raginesburg or Reganesperc takes its name from the river Regen which flows into the Danube just opposite the town; but if the weather be usually such as we experienced, the old city may have been called after the rain which pours down upon it so unmercifully. In 788 it became the capital of the kingdom of East Franks, and was for many centuries one of the wealthiest and most important of the free Imperial cities. Pilgrims and Crusaders passed through it on their way to the Holy Land; and from 1563 until 1806 it was the seat of the Imperial Diets, the ambassadors living in the street which still bears their name (Gesandten-strasse), and occupying houses upon which we still see their arms emblazoned. The old stone bridge, rising considerably in the centre, was built in 1135. It has lost two of its towers, but the remaining one upon the Regensburg side forms a picturesque entrance-gate.

The bishopric was founded somewhat earlier (739) by Winifred, a native of Crediton, Devon, who, under the assumed name of Boniface had been created Archbishop and Primate of all Germany in 732. In his "*Essays in Ecclesiastical Biography*" Sir James Stephens gives the following eloquent account of St. Boniface: "In the Benedictine abbey of Nutsall, near Winchester, poetry, history, rhetoric and the Holy Scriptures were taught in the beginning of the eighth century by a monk, whom his fellow-countrymen called Winifred, but whom the Church honors under the name of Boniface. He was born of noble and wealthy parents who had reluctantly yielded to his wish to embrace the monastic state. Hardly, however, had he reached middle life, when his associates at Nutsall discovered that he was dissatisfied with the pursuits by which their own thoughts were engrossed. As, in his evening meditations, he paced the long conventual avenue of lime-trees, or as, in the night-watches, he knelt before the crucifix suspended in his cell, he was still conscious of a voice, audible though inarticulate, which repeated to him the Divine injunction 'to go and preach the Gospel to all nations.' Then, in mental vision, was seen stretching out before him the land of his German ancestry; where, beneath the veil of the customs described by Tacitus, was concealed an idolatry, of which the historian had neither depicted nor probably conjectured the abominations. To encounter Satan in this stronghold became successively the day-dream, the passion, and the fixed resolve of Boniface; until, at length, abandoning for this holy war the studious repose for which he had already abandoned the world, he appeared in his thirty-sixth year, a solitary and unfriended missionary, traversing the marshy sands and the primeval forests of Friesland." But not having met with much success in converting the pagans, he returned to Nutsall, and was chosen abbot by the chapter of his monastery. In 719 he begged the bishop of Winchester to annul the election, and once more quitted his native land, "to solicit the aid of Pope Gregory II, in his efforts for the conversion of the German people." This he obtained, and leaving Rome, he travelled into Thuringia and Bavaria, and penetrated into the wilds of Saxony, converting and civilizing the people, and founding monasteries, into which he introduced copies of the Holy Scriptures. Pepin-le-Bref, whom he had crowned and anointed, appointed him the first bishop of Mainz; but in his seventy-fourth year he renounced his bishopric, and devoted the rest of his life to missionary work. "Girding around him his black Benedictine habit and depositing his copy of St. Ambrose's '*De Bono Mortis*' in the folds of it, he once more travelled into Friesland, and, pitching his tent on the banks of a small rivulet, awaited there the arrival of a body of neophytes, whom he had summoned to receive at his hands the rite of confirmation. Ere long a multitude appeared in the distance advancing toward the tent; not, however, with the lowly demeanor of Christian converts drawing near their bishop, but carrying deadly weapons, and announcing, by their cries and gestures, that they were pagans, sworn to avenge their injured deities against the arch-enemy of their worship. The servants of Boniface drew their swords in his defence; but, calmly and even cheerfully awaiting the approach of his enemies, and forbidding all resistance, he fell beneath their blows — a martyr to the faith he had so long lived, and so bravely died, to propagate. His copy of Ambrose, '*De Bono Mortis*,' covered with his blood, was exhibited during many succeeding centuries at Fulda as a relic."

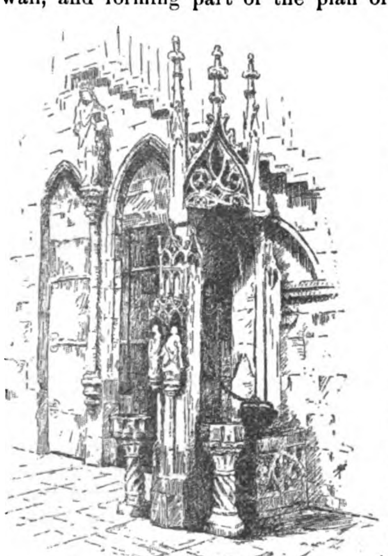
The splendid church erected in 1835 at Munich by Ludwig I, is dedicated to the apostle of Bavaria, and the frescoes with which it is decorated, record incidents in the life of the saint. The building is almost identical with the basilica of St. Apollinaris Nuovo at Ravenna, the series of medallions in the spandrels of the arches representing (in the modern church) St. Benedict, as founder of the order, St. Boniface, and his fellow apostles of Bavaria — St. Willibald, St. Corbinian, St. Rupert, St. Emmerau, St. Cylien, St. Magnus, abbot of Füssen, and other Benedictines.

Regensburg is a net-work of small streets and alleys paved with cobble stones, and bearing as extraordinary names as many in the good City of Norwich. A little street of barely a hundred paces long is called Gässchen ohne End.[2] Then we find Gichtgasse,[3] Wermut strasse,[4] Entengang,[5] Hundsumkehr,[6] Eck zum faulen Schinken,[7] (now called Eck zum Vaulschink), Frohliche Türkenstrasse,[8] Zur Schönen Gelegenheit,[9] Hinter der Flasche,[10] Roter Herzfleck.[11] Many of the oldest churches of the town have been so completely spoilt in the seventeenth or eighteenth centuries, that little of any value remains. The Niedermünster, built in 1152 by its abbess, Kunigunde, the Alte Kapelle in 875, and the Obermünster in 1010,

[2] Endless Lane, or lane without an end or outlet. This is curious as giving a clue to the meaning of our own endless streets. There is one at Salisbury, which is, I think, the only street in the town without an outlet, thus giving a reading of the word "endless," which is just the opposite to that which we usually apply to it. [3] Gout or Palsy Lane. [4] Wormwood Street. [5] Duck Lane. [6] Dog's Turning Place. [7] Putrid Ham Corner. [8] Merry Turk's Street. [9] A Happy Opportunity. [10] Behind the Bottle. [11] Red-stained Heart.

by Abbess Wiborg, assisted by the Emperor Heinrich II, all belong to the early Romanesque style, but Rococo ornament and decoration have so disfigured them that they afford no interest to any person of taste — unless the Black Virgin brought from Palestine (from Gethsemene) in 950 by the Empress Juta, and a picture of the "Holy Mother," painted by St. Luke, and given to the Emperor Henry II by Pope Benedict VIII in 1014, may be considered interesting. The former is undoubtedly only ancient and Byzantine in type, and style of workmanship; whether our faith be of sufficiently robust a character as to enable us to believe in the authenticity of the evangelist's signature upon the picture, is a question for each individual to decide for himself. Besides the Roman remains already mentioned, the town possesses a relic of the castle, the "Römerturm" or "Heidenthurm," a square tower of solid rough masonry, and probably the oldest building in Regensburg.

The Cathedral of St. Peter, though not nearly so large as those of Cologne, Strassburg and Ulm, is, in many respects, more interesting. Begun in 1275 by Bishop Leo of Thundorf, the work crept on for three centuries, leaving the towers unfinished until our own time. They were completed in 1869 and are 107 metres high, the spires much resembling those of Cologne, but of better proportions. The plan "is much more German than French in its arrangements, having three apses instead of a *chevet*. The side-aisles are wide in proportion to the central one, the transept subdued, and altogether it is more like the old round Gothic basilica than the French church,"[1] and although the building went on from 1275 until 1534, the architects kept sufficiently to the original plan, as to prevent any want of harmony in the main structure of the church, or of the details, which are pleasing and elegant throughout. The west porch is peculiar, and unlike those of most other churches. It is triangular in plan, having a pier built out onto the steps. From this pier, an arch springs on each side and joins the main wall right and left of the portal, thus forming a double porch. The interior is imposing with its fourteenth and fifteenth century stained-glass and old tombs. Notable is the middle window of the choir, depicting St. Walburga, and the tomb of the Prince-bishop Philipp, erected by his brother, Duke Maximilian I, in 1598 — a life-sized kneeling figure in bronze occupying a position in the centre of the nave. The arrangement of the side-chapels is also peculiar. Instead of being built out from the wall, and forming part of the plan of the church, they are small canopied structures supported by four pillars, after the manner of a *baldachino*. One of them in the north aisle is ornamented with statues of Heinrich II and Kunigunde. Similar in treatment is the draw-well in the south aisle. It is 60 feet deep and still has its old wheel, chains and bucket. Upon the shaft which supports the canopy are figures of Christ and the Woman of Samaria, by Wolfgang Roritzer (1501), the sculptor of the elegant *Sakrament's-häuschen* on the left of the high-altar; not so tall as the one by Adam Kraft in St. Lorenz, Nüremberg (which is about ten feet higher), it is almost as beautiful. The frontal of the high-altar is an elaborate work in silver, but of little artistic value. It was the gift of Bishop Anton Ignaz, Graf von Fugger (1767-1787). In the north aisle is a bas-relief by Peter Vischer, over the tomb of Margaret Tucker (1521), representing our Blessed Lord and the Sisters of Lazarus.



The Draw-well.

The treasury is a model to some other churches, and is evidently cared for lovingly by its custodians. It is well-lighted, and all the valuable contents are excellently arranged in strong, handsome oak cases with drawers. Unlike one of the Hildesheim churches, which only provides a common deal closet for its precious tenth-century filagree and jewelled processional cross, the sacristy of the Dom at Regensburg is protected by iron doors, and the cases are all lined with iron. The treasury contains a great many specimens of the goldsmith's art, although war in the shape of Bernhard von Weimar and his Swedish soldiers, robbed it of no less than 1456 pounds-worth of silver. The most notable contents are the chalice of St. Wolfgang (*d.* 994) and a Limoges enamel *châsse*. The pedestal of the former is of the fourteenth century. The St. Andrew's cross is a beautiful filagree and niello work set with precious stones, somewhat similar to the St. Bernward's cross at Hildesheim, but not so fine, and perhaps of slightly later date. Another cross of Bohemian workmanship, gold literally covered with precious stones, was the gift of King Ottokar. Amongst the relics is the hand, black with age, of St. Chrysostom, brought from the Holy Land. In another case are monstrances, a thirteenth-century pyx, and some exquisite Spanish and Brussels point-lace ornamenting albs. Our guide evidently took pride in showing us his treasures, and finding us sympathetic, he displayed the contents of the drawers, filled with exquisite specimens of old embroidery. Entire sets of vestments of the thirteenth, fourteenth and fifteenth centuries, corporals, jewelled mitres, altar frontals and the chasuble of St. Wolfgang. The orphrey of this vestment is intact, but the foundation is modern.

On the north side of the Dom is the *Esel-thurm*, erected temporarily instead of a scaffolding, and taking its name from the asses who carried up the building-materials upon their backs. In the cloisters, which have been completely spoilt by fantastic and tasteless Renaissance ornament, are two most interesting buildings of much earlier date than the cathedral. The Alte Dom, or Stephans Kapelle, is the oldest known example of German basilican churches. It has no west entrance, a peculiarly German arrangement, but that end of the church is occupied by a low gallery supported by stunted pillars and round arches. Upon each side are ten vaulted niches in the thickness of the walls, at the upper part of which are small windows; and at the east end is a somewhat larger semi-circular recess in which stands the stone altar, a solid block, hollowed out for the reception of relics and having at the lower part a row of little round arched apertures. As there is a tradition that the body of St. Wolfgang was placed upon a bier in this chapel in 994, we have some idea of the date of its foundation, although no authentic records are extant.

Allerheiligen Kapelle.

The Allerheiligen Kapelle was built in 1160, over the grave of Bishop Hartwich II. It is sometimes called the Baptistry, though why, it is difficult to say, as it is evidently a small memorial chapel. Having somewhat the appearance of a circular church, it is in reality, a square plan, surrounded by three apses, and surmounted by an octagonal dome with eight windows.

The fourth side of the square forms the entrance from the cloisters — and the only one. In the eastern apse is a stone altar supported by Romanesque pillars, and upon the walls are the remains of fresco paintings. Seen from the opposite side of the cloisters, it is a picturesque object rising from the long, unkempt grass, in its simplicity and beauty.

Of all the religious foundations of Regensburg, the Benedictine monastery of St. Emmeran was the largest and most important. Founded about 652 by Theodo IV of Bavaria, to atone for his son's sin in falling upon and killing the saint through some error, it quickly became noted as a school and seat of learning, and as a repository for manuscripts and books. The monks were also famous for the manufacture of a beautiful purple-red dye, made from the insect *coccus polonicus;* and we find from the annals of the year 1031, that the work of collecting these creatures was the duty of the peasants of certain communes.

Charlemagne enlarged the convent, and his successors added to its riches and importance, and many were the notable Bavarians who were educated within its walls, and buried within its precincts. Abbot Gawibald who died in 761 became the first bishop of Regensburg, and up to the time of St. Wolfgang the two offices seem to have been held simultaneously. In 1295 the abbots were raised to princely rank, and sat upon the episcopal bench at the Imperial Diets.

The main entrance, a late Romanesque façade built about 1049–61 and painted in fresco, is now closed, and a great part of the monastic buildings are in a state of ruin. Behind the porch is a grass-grown fore-court which was formerly the main entrance to the convent. It has an open arcade round it, and on one side, a detached tower built in 1575. Here, almost hidden amongst the grass and weeds, in charmingly picturesque disorder, are the tombs of abbots and monks; and upon one side, under the arcade, a calvary erected by the Imperial Master-of-the-Mint Lerch in 1513, as a propitiation for his sins in slaying one of his servants. One reads in the annals of the town, of ears being cut off for far smaller crimes; why then should a patrician expiate his sins by giving of his superfluity, of that which cost him little? In the paved part

[1] Fergusson.

of the court from which the church-door opens, is the so-called Heinrichsstuhl, an ancient stone seat upon which the Emperor Heinrich II was wont to rest. The chronicles relate that when St. Henry held his court at his birthplace, Heinrichsburg, an ancient feudal castle upon the Danube, and probably the Roman Abudiacum, he was in the habit of walking into Regensburg daily to attend an early mass at St. Emmeran. The distance was some eight or nine miles, and when he arrived too early, he rested himself on this somewhat chilly and uncomfortable arm-chair.

The church has two choirs, that at the east end, apsidal, the western one, square. The latter, the Dionysiuschor, is raised some feet above the level of the church, and has stalls round three sides of it. The ceiling is of panelled wood, with portraits of Benedictine fathers painted upon the central spaces. Underneath this choir is the crypt and tomb of St. Wolfgang. Unfortunately fire and the eighteenth century have in a great measure destroyed the Romanesque character of the church; but a good many tombs, mostly with recumbent figures, of more or less interest, have survived these and other destroying agencies. Amongst the latter are those of St. Emmeran; Queen Uta, wife of the Emperor Arnulf, thirteenth century; Heinrich von Bayern (*d.* 995); Warmund von Wasserburg (*d.* 1020); the Emperors Arnulf and Ludwig (the child); and in the crypt of the eastern choir, the relics of St. Ramwold. The finest is the recumbent tomb bearing the name of Aurelia, 1026, with an effigy of the Blessed erected in 1335. She was supposed to be a French princess driven from her home to escape a disagreeable marriage, and coming to Regensburg during the abbacy of St. Ramwold, she passed fifty-two years of her life in fasting and prayer, and was buried in a Roman sarcophagus bearing the name of Aurelia upon the lid.

The treasury contains a silver *châsse*, some relics of St. Emmeran (1423), two Romanesque candelabra, St. Wolfgang's pastoral staff, and an ivory ciborium. But these are only a tithe of the valuables which formerly belonged to the convent, and which Bernhard of Weimar found so useful for converting into money, as for example, a beautiful gold altar frontal and cross laden with one thousand precious stones, made for Bishop Tuto between 894 and 930.

The numerous conventual buildings secularized in 1803, and the beautiful cloisters with their twisted columns, now form part of the palace of the Prince of Thurn and Taxis. S. BEALE.

[To be continued.]

CARVING IN PARIS.

In the *Portfolio*, Mr. P. G. Hamerton has begun a series of illustrated papers on "Parisian Architecture since the Empire." The following extract will suggest the spirit in which they will be composed: —

One of the most important changes in the new tendencies of French architecture is a disposition to estimate commercial sculpture at its proper value, that is, simply to do without it. One cannot imagine that it would add in the slightest degree to the happiness of any true lover of what is delicate and genuine in the fine arts, to live in a house that had been carved all over with coarse festoons of impossible leaves and flowers, alternating with heads of unnatural animals. There comes a time when these things are not only superfluous but wearisome, as carved furniture vexes a taste that is not either infantine or barbarous unless it is intelligently designed. In the new Parisian architecture carving is often rejected altogether, and when admitted it is not employed without reserve. So far the change is in the Classical direction. Superabundant carving does not belong to the ages when sculpture is at its best, but to ages, such as our own Elizabethan, which from the artistic point of view are still essentially barbarous. I do not wish to undervalue the Parisian carvers of ornament. They are the best in the world, and it is just because they are capable of doing refined work under good architects that they ought not to be set to vulgar commercial work. Let them be employed in realizing beautiful designs without the hurry of rapid manufacture. The advance of the critical faculty, whilst discouraging the mere trade of carving, would be favorable to the art. There are, by this time, a number of new houses in Paris on which sculpture has been employed sparingly, but in the most important positions and isolated by restful margins of plain stone.

The reader probably knows the calcareous stone of which Paris is built, and which comes from inexhaustible quarries chiefly to the north of the capital. Superb blocks of it are brought into the city every day on massive trucks drawn by long strings of horses. The fronts of the new houses are always substantially built and the heavy white stones may be seen protruding and awaiting the hand of the carver, who turns them into brackets, cornices or carved panels. The temptation to carve such stone is almost irresistible. It is soft and pleasant to chisel, yet not so soft as to refuse to take sharp edges, and it does immediate justice to the sculptor's intentions, the surface being uniform in its dead whiteness. In the days when there was hardly any coal smoke in Paris, the stone first turned yellowish and then gradually passed to a light golden-brown, whilst the surface became harder as time went on. In such favorable conditions as these it is not surprising that sculpture should have been overdone and vulgarized, so that the tendency is now rather towards other modes of decoration. The case reminds me of a change of fashion that occurred lately in the ceramic art. A new way of decorating faïences had been invented and brought to great perfection by a few practitioners, particularly by one lady artist of distinction. Then came imitators who vulgarized the process and established a low scale of prices, to which their betters had to conform, but not without a sacrifice of quality. The public perceived the deterioration and withdrew its encouragement, so the art fell to the ground and was abandoned. The art of ornamental sculpture in stone is in danger of sharing the same fate. One reason against its continued prosperity is the demand for color in external decoration, which has sprung up during the last few years. Panels of painted faïence or colored marbles are let into the walls, and so are courses of glazed bricks. As these give a good and sometimes a brilliant decorative effect, the need for sculpture is hardly felt, and a very little of it suffices. The present tendency in this direction was foreseen many years ago by Viollet-le-Duc, when he gave amongst the illustrations to his "*Entretiens sur l'Architecture*" an example of a shop and house front constructed as an iron framework, the space being filled-up with bricks faced with colored faïences. Another modern tendency has the effect of making sculpture almost superfluous. Artistic wrought ironwork has been better understood than formerly, and produced more abundantly for balconies. It can be made the principal decoration, and in a few instances it has been made the almost exclusive decoration. There is a new house in the Rue des Bernardins of plain brick with hardly any structural interest except a loggia on the top, yet it is rich enough in consequence of its balconies of wrought-iron, which are ingeniously connected together so as practically to mask the otherwise too great simplicity of the masonry, and the whole produces quite a satisfactory effect as the reader may judge. He will observe a stone house beyond, which is, in fact, a school, and which also shows the present tendency to originality in Parisian building if we compare its windows with those of the Rue de Rivoli. The loggia or open gallery, so common in Italy, and occasionally met with in old French châteaux and towns, has been very rarely adopted in Paris, but it is beginning to appear rather more frequently in the new houses, and is a most valuable architectural feature on account of the variety it gives to a design as well as a lightness to the upper story that can be equalled by no other arrangement. In the bright sunshine, which is not rare even so far north as Paris, the loggia gives superb effects of light and shade, as well as an excellent opportunity for the introduction of color. With good judgment the architect has answered the lightness of the loggia by introducing heavy stone arches in the basement, where they have to carry the weight of the edifice. It is very characteristic of France, where architecture has always been valued on its own account, that this house has been erected in one of the narrowest and most obscure little side streets of the capital, unfrequented by the fashionable world. — *The Architect.*

THE "ARTS AND CRAFTS" EXHIBITION, LONDON.[1] — II.

THE score or so of pieces of furniture in the exhibition will not detain us long; we gladly note, however, an attempt, more or less successful, on the part of the Society to fulfil its great aim, viz, to bring art to the homes of the people. Of this, the rosewood sideboard by Mr. R. Blomfield is an instance: a good design of moderate size, ornamented by inlays of satin-wood and a rich redwood, it is all one can wish. His print-cabinet, in oak, walnut and ivory, is small, but compact, both design and workmanship being excellent. Mr. Spooner sends a sideboard and cabinet in oak, both severely simple in design and ornamentation. A specimen of a good design by Mr. Spooner, well and inexpensively carried out by the Wood Handicrafts Society, is a lady's work-cabinet in oak, stained green, with neat brass fittings; the front letting down to form a table, adds to its apparent usefulness. The rosewood settee, with back and seat caned, by Mr. Blomfield, is roomy and comfortable. That by Mr. Alma Tadema, is of the form familiarized to us in his pictures of Roman interiors.

Mr. Cave's cottage pianoforte, designed for Bechstein, is of plain oak, and decidedly utilitarian in appearance; it has a narrow shelf under the desk, and the lights are fixed on the top of uprights in continuation of the front legs, — which may be an improvement.

The few chairs present no noteworthy features, nor do the tables.

Among the really good exhibits of fireplaces, we select one, designed and modelled by Mr. G. Jack, on account of its quaintness and the general air of comfort it gives by its size. It is of cast-iron, with beaten and polished iron lintel, fender, etc. On the left cheek are the following lines:

THE FIRE MY GLITTERING FATHER IS,
TH' EARTH'S MY MOTHER KIND,
THE SEA MY YOUNGER BROTHER IS,
BUT ME NO MAN CAN FIND,

while between the lines are the sun and birds — a tree — and fishes. On the opposite cheek the new moon and stars, with the words, — "Who can stand against His cold?" The chimney-breast above is also by Mr. Jack; of modelled and colored plaster, in a sort of lattice pattern, with very natural sea-gulls flying across it, suggesting storms without.

The splendid chimneypiece for the Duke of Portland, designed

[1] Continued from No. 937, page 122.

and executed by Messrs. H. Wilson & Pomeroy, is really a poem in alabaster, illustrating as it does, one by Mr. William Morris, named "Rapunzel." The carving in the centre of the chimney-breast is very fine, and represents the heroine, who wears a coronet, leaning over the parapet of the castle; her hair, yards and yards of plaits, being let down at the bidding of a witch, who climbs up by it, as a short quotation will best explain:

RAPUNZEL, *loq.* "Is it not true that every day
She climbeth up the same strange way
Her scarlet cloak spread broad and gay
Over my golden hair?"

WITCH. "Rapunzel, Rapunzel,
Let down your hair."

RAPUNZEL. "See on the marble parapet
I lean my brow, strive to forget
That fathoms below my hair grows wet
With the dew, my golden hair."

To the right and left are medallions, one with the Prince weeping in the wood; and another with the witch crooning over her caldron. The over-mantel is without carving, but has large inlays of dark mother-of-pearl, which also occurs below as serpents.

Also for Welbeck Abbey, to be placed in the private Chapel, Messrs. H. Wilson & Pomeroy exhibit an alabaster font, embellished by elaborately-carved symbols and inlays of mother-of-pearl, the brass bowl for which, with a cross and pair of vases, was manufactured by Messrs. Longden.

Sir F. Leighton sends his modelled studies for "Perseus and Andromeda." "The Daphnephoria" and "The Gardens of the Hesperides."

In the same room is the design by Mr. F. W. Pomeroy for a tablet to be erected in Holy Trinity Church, Chelsea, by the members of the London Art Workers' Guild, to the memory of the late Mr. J. D. Sedding, "To record the affectionate admiration in which they hold the memory and art of their Past Master." The profile in bas-relief is a faithful likeness of one whose talents and worth will not easily be forgotten by those who knew and loved him.

There are several shields, sconces, trays and vessels for household use in beaten copper, decidedly the best of the former being two in repoussé work by Mr. Walter Crane; a sconce in bright, hammered steel and the ornamented copper mug, designed by Mrs. Alfred Waterhouse, and executed, as is much of the metalwork, by various rural industrial societies, thus increasing its interest.

The few brass and copper table-lamps and certain candlesticks, etc., designed by Mr. W. A. S. Benson, owe their excellence to the simple elegance of the design and good workmanship. We may say the same of some of the dishes and salvers in hammered silver, by Miss Middleton, Birmingham Municipal Art School, Miss Edwards and Mr. Catterson-Smith, respectively.

The Guild and School of Handicraft send a case containing pieces of hammered hollow-ware in various metals, from which, for its beauty, and high artistic merit, we must select a gold bracelet with onyx and gold pendants.

The painted enamels for buckles, brooches, etc., executed at the Finsbury Technical College, London, must also be highly commended for both design and finish. Messrs. Powell & Sons exhibit a few specimens of the exquisite glass for the table and for ornament, for which they are so justly renowned.

An altar front designed by Mr. Lethaby, and executed by Messrs. Farmer & Brindley, is very rich in color, being a panel of lapis lazuli, arranged by Mr. Brindley, with a border of mother-of-pearl.

On the floor of this west room, we see the so-called "Hammersmith Carpet," designed by Mr. Morris and made at his factory. It is evidently based on Arabian and Persian models, but just misses the subtilety which gives to these their ever-enduring charm. Unfortunately Mr. Morris has selected so delicate a scheme of color that it cannot last, and is even now beginning to fade.

Some few examples of the highly decorative gesso-work demand special notice: Mrs. C. Wylie's "Veiled King Death," Mr. Bone's "Return of the Vikings," and "The Days of Creation," by Mr. Silver. The first is wonderfully novel and attractive; it is in tempera and gesso, and represents Death with wings of the deepest indigo, wearing a mantle of the same hue, brightened by gold, while around his gold and jewelled crown is a silver halo. In his right hand he has a golden dart, and in the left a clasped book, which rests on a sun-dial. The face, pale and with deeply sunk eyes, seen through a thin gray veil, wears an expression, firm, yet withal so regretfully tender that we forget we are gazing on the semblance of one who is, to many, the "King of Terrors." Butterflies are appropriately carved on the frame. Mr. Bone's small panel is very masterly in conception, its only fault being that the sea is absolutely smooth. "The Days of Creation" is in the style of, but a long way after, Mr. Burne-Jones. The designs for printing textile fabrics are all more or less good, but present no special features and the same remark may apply to the wall-papers. A new departure has been made, viz: That of having workmen on the spot, cutting the blocks and rollers in wood and copper with which to print certain designs; an interesting process, but rather noisy.

We might fill a page with descriptions of the embroidery, but forbear. Suffice it to say that the portières, table-centres, piano and sofa backs, etc., are all that the most fastidious could desire. The embroideries in silk or wool from the Royal School of Art Needlework, the Leek Society and the Langdale Linen Industry, are all distinguished by the high artistic merit for which these various schools are now so famous.

Mr. Morris is seen both as artist and poet in some hangings, a portion of which is shown, for Kelmscott Manor. They are composed of white linen embroidered in wool; the design on the curtain being a pomegranate tree in full bloom, about which are flying birds with gay plumage, such as jays and parrots, all the colors being most rich and harmonious. Worked on the hanging is a little gem of a poem by Mr. Morris, of which it is difficult to omit any part:

The wind 's on the wold
And the night is a-cold,
And Thames runs chill
'Twixt mead and hill.
But kind and dear
Is the old house here,
And my heart is warm
'Midst winter's harm.

Rest, then, and rest,
And think of the best.
'Twixt summer and spring
When all birds sing
In the town of the tree;
And ye lie in me
And scarce dare move
Lest earth and its love
Should fade away
Ere the full of the day.

I am old, and have seen
Many things that have been,
Both quiet and peace,
And wane and increase;
No tale I tell
Of ill or well,
But this I say,
Night treadeth on day,
And for worst and best
Right good is rest.

The south room is entirely devoted to books. In the centre Mr. Morris has one of his hand printing-presses at work, while two or three cases contain specimens of beautiful printing from the deservedly famous Kelmscott press; and as both type and ornaments were designed by Mr. Morris himself, the result is in most instances pleasing and good. It is a mistake, however, for Mr. Morris to expect us to follow him in his love of Gothic printing; that belongs to the past, with the hand printing-press and the spinning-wheel. In this busy nineteenth century, books require to be so printed, that literally "he who runs may read."

The bookbinder's skill is exemplified in two cases of bound books and covers. One of these is from the "Dove's Bindery": the designs are by Mr. Cobden-Sanderson, the tooling and finishing showing no depreciation of the technical skill so attractive at the last Exhibition. The second case contains binding and covers designed and executed by Miss Nichols, Mr. and Miss Maccoll, Sir Edward Sullivan, and others, besides some from the famous house of Zachnsdorf. These latter consist of the poems of Wyatt, Surrey and Herrick designed by Mr. Lewis F. Day and tooled by F. Maullen; they are all richly gilt and in the best taste; the two volumes of Herrick being very suggestive of the quaint conceits of the poet.

Among the studies for book illustration with which the walls are covered and adorned, we note first those for the 1857 edition of Tennyson's poems by D. G. Rosetti, the title-page and frontispiece for Christina Rosetti's "*Prince's Progress*" and his beautiful "*Dante's Amor*" "that moves the sun and stars," a design for the centre panel of a cabinet, the crescent moon bearing the face of Beatrice.

The two new editions of Hans Andersen's tales just published by Mr. G. Allen, one an *edition de luxe* as regards the quality of the paper and size, will owe some of the popularity they will certainly meet with to the hundred or so of illustrations and initial letters by Mr. A. J. Gaskin of the Birmingham School of Art. He has so thoroughly entered into the Old-World spirit, and charming simplicity of these delightful fables as to shed an additional beauty on a book ever welcome to children, old and young. We may add that Mr. Burne-Jones has expressed his warm approval of this work of one who is an evident disciple.

Mr. C. Gere and Mr. New each exhibit some spirited sketches for book illustration. We should have mentioned with praise the three decorative paintings for the Birmingham Town-hall by Messrs. Gere, H. Payne and S. Meteyard, respectively, all of which we gladly welcome as evidence of the high character of the work done at the Birmingham Art School, of which they are students.

We had hoped to be able to give our readers a few lines on the Exhibition just opened here of French Decorative Art, but what can be said of plush picture-frames, roses painted on pianofortes, wall-papers which are bad both in color and design? The French decorative artists had an opportunity of rivalling and even of outshining, those of England, and have miserably failed. We have all along surmised that art was not advancing in France at the rate it was in England, and now we are sure of it.

The etchings prove undeniably that in this respect France still bears the palm, but etchings can by no stretch of the imagination be considered purely decorative objects.

FRENCH DECORATIVE ART.

THE Grafton Gallery in London has opened its doors to the rivals of Messrs. Morris and Walter Crane — Frenchmen, devoted to the decorative arts. There is little which is new to visitors to Paris, who care to investigate the art of that city beyond the precincts of the Louvre and Luxembourg; but to the ordinary Londoner most of the work here exhibited for the first time must be exceptionally original. If the inspiration from which English decorative art mostly draws is in the main Mediæval or Italian Renaissance, France, on the other hand, looks to Japan as her master. One sees the Japanese influence in the colored engravings of M. Guérard's "Rabbit," in M. Boutet's "Girl" and in M. Lepère's "Jeunesse passe vite, Vertu!" Quaint and original also are those of MM. Maufra, Besnard and Renoir; flat coloring outlined by a black line, no perspective and the brightest of tints.

Turning round, are those exquisite specimens of glass from the manufactory of M. Leveillé — doubtless well-known to visitors to the Chicago World's Fair?

M. Charpentier exhibits two exquisite lock-plates in steel, with bas-reliefs of boys singing and playing the violin. Only the heads, shoulders and hands appear; but in the realism of the treatment and the sad, emaciated faces of the boys, the works of Donatello come to mind. "*Le chant*" is as thoroughly the *gamin* of Paris, as the little S. John, by Donatello, is the Florentine beggar; both artists draw their inspiration from Nature, and both from the same class of Nature's children.

The Deck pottery is largely represented, and most beautiful some of it is; notably the gourds with Renaissance designs upon a jade ground.

M. Delatre's colored etchings are very original, reminding one of the hand-colored prints of one's childhood — the figures just outlined and flat tints laid on. Specially beautiful of this series are "In the Garden" and the "Old woman at a window." Beauty perhaps is a term some may take exception to in relation to these etchings, but it is the beauty of feeling and sentiment.

A piano, decorated with Japanese lacquer panels, style Louis XVI, shows that even that ugly instrument can be embellished — I mean ugly in form, for scarcely anything can be less interesting than the modern piano? This particular "cottage" is really a beautiful work of art. A "grand" hardby of satin-wood decorated with poppies and butterflies, by Mlle. Desbordes, is elegant, but I prefer the sober richness of rosewood, bronze and lacquer.

In the matter of advertisements, France sets us an example as in most things artistic. The large posters issued by M. Grasset are at once effective, striking and original. Some French examples of posters are vulgar, no doubt, and err in the manner peculiar to M. Van Beers, but they are nevertheless clever; English bills of the same kind — high-heeled ladies skirt-dancing, and ballet-girls standing on one toe, are equally vulgar, but instead of being clever, are intensely stupid and inane.

Perhaps the most beautiful object in the galleries is a bronze knocker, by M. Injalbert, a work by the *cire perdu* process, which equals the best examples of the Italian Renaissance. Oddly enough, furniture, a branch of decorative art in which the French are preëminent, is all but unrepresented. This is a pity, for even the modern styles of furniture shown in the '89 exhibition were quite worthy a journey to London, and some of the imitation Louis XVI and Louis XV cabinets were as beautiful as the originals in the Louvre.

PENGUIN.

THE DISTRIBUTION OF POWER FROM NIAGARA.

FOR years past we have been persistently told that we are being beaten in mechanical progress by America. The globe-trotter, fresh from his travels, relates that the fastest locomotives are to be found across the Atlantic, that the output of pig-iron in the States is greater than here, that the blast-furnaces get through double the work of the best Middlesbrough practice, that every village has its electric-lighting station, and that the length of electric tramway is to be measured by thousands of miles. These, and many other unpleasant comparisons, he showers broadcast, because no answer can be given to them which his understanding is capable of grasping. It is useless to point out to him that progress in America follows the direction of the needs of the country, and that in a country governed by different conditions, and having other needs, the same phenomena might indicate the reverse of progress. Such conditions are not capable of being set forth in the concise form necessary for his prompt extinguishment, and his habit of superficial observation prevents him from giving sufficient attention to understand a lengthened explanation. It was, therefore, with feelings of gratification that, some two years ago, Englishmen learned that the body of New York financiers, who had determined to utilize some part of the energy of the Falls of Niagara, had come to Europe to be advised as to the best methods of carrying out their enterprise. This, at least, furnished direct proof that we were not altogether behind our cousins in engineering science, and furnished a telling answer to unpatriotic detractors. Later on, when Prof. George Forbes was appointed consulting electrical engineer to the Cataract Construction Company, the whole of his colleagues in London felt that a high compliment was paid to the English branch of the profession, and one that could scarcely have been expected, since both the continent of Europe and the States furnish better grounds for gathering experience in the transmission of power by electricity than any to be found here. Had the post been offered to a Swiss or German engineer, the choice would have appeared only befitting, and would have been accepted here as quite natural.

The announcement that Professor Forbes would read a paper on the 9th ult. before the Institution of Electrical Engineers drew a large audience, eager to learn how far the rumors current as to the designs adopted were correct. The distribution of 100,000 horse-power is such an immense stride in advance of anything hitherto attempted, that the responsibility of deciding on the system to be adopted is not one to be lightly undertaken. Of course it was known that the alternate current would be adopted — it has long ceased to be a matter of speculation as to whether it or the direct current is best suited for the purpose. But speculation ranged over single-phase, double-phase and multi-phase currents; over high-tension generators *versus* step-up and step-down transformers; over synchronous and non-synchronous motors; over overhead lines and conduits, and many other points. In a general way, Professor Forbes satisfied the curiosity of his audience, although he left them in the dark as to many matters of detail.

His plans may be briefly described as a series of compromises between what he would like and what he can get. The most noticeable feature is the adoption of low frequency of current. After many experiments, he settled on 16⅔ alternations per second as the most advantageous number, as compared with the 42 of Ganz, 76 of Siemens, 100 of Brush and 133 of Westinghouse. But he found that machines built to fulfil this condition would be too heavy to be placed at the end of the shafts of the 5,000 horse-power turbines that are being constructed, so he altered the figure to 25 alternations. As regards voltage, the conveniences of keeping the generator to a moderate figure, and transforming up onto the line, were evident. But it was found that transformers to step up from 2,000 volts to 20,000 volts and down again, would be as expensive as the generator, and thus double its cost. The desirability of producing current of the final pressure was thus made evident, and 20,000 volts were adopted as the standard. This was not an extravagant figure, and did not represent any great advance upon what had been done before. At Deptford, where one pole of each generator is put to earth, the voltage is 10,000, that is, the greatest difference of potential between the line and earth is the same as in an insulated system working at 20,000 volts. This is so well understood that several European contractors would readily undertake to supply dynamos to work at this pressure. But in America the case is different; experience there stops at 2,000 volts, and manufacturers could not be found to undertake machines to withstand more than 5,000 volts. The engineer had, therefore, the choice of advising that the machines should be imported, or of reducing his pressure. He chose the latter; the import duties would have been exceedingly heavy on foreign machines, while the national feeling would possibly have been wounded at their introduction. Consequently the original plan was set aside, and 2,000 volts adopted as the standard for the first three machines. These machines are to give a two-phase current, that is, there will be two separate circuits in them, so disposed that the current in one will be 90 degrees in advance of the other. These currents can afterwards be utilized in any way that is most convenient. They can be used separately to drive syncronizing motors, or together in Tesla motors; they can be more easily rectified than a single-phase current for use in street-railways, electro-metallurgy, etc. The prospective output of the Niagara works is so large that provision must be made to fulfil all important demands, however different they may be.

It is intended to run the mains, which are eventually to extend to Buffalo, some twenty miles distant, in a culvert of such dimensions as to allow a man to walk through. Provision is made for a large number of conductors. This conduit is already in course of construction for a length of 2,500 feet, to carry the conductors to the Pittsburgh Reduction Company's works, who will be one of the first customers.

Such are the main features of the scheme which Professor Forbes expounded to his audience at great length. He disclaimed any great originality for them, and took his audience very fully into his confidence as to the reasons which influenced him in his decisions. He set out with the determination that he would produce one kind of current only, and that his machines should be both interchangeable and capable of working in parallel. He would not have one kind of machine for arc-lighting, another for incandescence-lighting, another for electro-metallurgical work, and so on. Such an arrangement would have doubled the outlay for plant, for no machine would ever have been working at its full capacity. Now in America parallel-working is practically unknown, and manufacturers are naturally cautious as to how they enter into guaranties for its accomplishment. "It is a matter of common knowledge," said Professor Forbes, "that parallel-working is assisted by lowering the frequency." This, then, was one of his reasons for choosing a low figure. Another was the desire to render it possible to use ordinary continuous-current dynamos as synchronizing motors, by the addition of rings attached to the

commutator bars in such a way as to communicate with each alternately. Such motors work well with alternate currents of low frequency, particularly if the fields and armature be carefully laminated. Professor Anthony reports that small motors of this kind "run very nicely where the alternations do not exceed 25 per second," and that "at 8 per second, large motors could be run with perfect success." No doubt it will be a convenience for people in the neighborhood to use this type of motor for small work, but the amount of power they will require is not likely to be so large as to render it worth while to modify the plant for their accommodation. Professor Forbes devoted considerable time to this point, but he had other reasons to urge in defence of low frequencies. He recalled the fact that it had been thoroughly established that the performance of syncronizing motors is very much improved by using low frequencies. Also that those that have used the motors with rotating field of the two-phase or three-phase type, have all been obliged to reduce the frequency of the current to get the best results. It is found that in every self-starting alternating motor, whether multi-phase or otherwise, the effort at starting is increased by lowering the frequency. He added:

"I wish to repeat that, from what I have seen in the workshops of all advanced electricians in the last year or two, I am confident that in the near future single-phase alternating-current motors, self-starting on full load, will be largely used; and there is not the slightest doubt that all of these work far better with low frequencies. In fact, as Mr. Brush once said to me when I was discussing this matter with him, 'Really, your best plan would be to lower the frequency so much that you get a direct current.'

"Whilst speaking of low frequency in relation to motors, I must say that I have much greater hopes of obtaining a good commutating device with a low frequency than with a high one; and I will also state that I have great hopes of important advantages coming to us from the invention of such a commutating appliance which will enable us to furnish street-railway companies, electro-metallurgical works, and other consumers with the direct current without the use of any heavy revolving machinery at the transforming station."

The advantages of low frequencies are not confined to the motors; they also pertain to the conductors. An alternating current of high frequency tends to confine itself to the outside of the conductors, thus increasing the total resistance; the impedance of the line is also increased by the magnetic field formed between the go-and-return wires. Again, there is greater tendency to discharge from an electrified conductor into the air, and the difficulty of insulation is increased. On the other hand, with low frequency, the capacity of the cables is less troublesome, and there is less loss of static charge by heating of the insulation. Abnormal rises of electric pressure in the mains above the pressure generated by the dynamos, due to the resonant effect produced by the capacity of the cable and the self-induction of the circuit, may be reduced by lowering the frequency.

While Professor Forbes dwelt at very considerable length on the advantages of low frequency, he did not pass over its disadvantages. The first is that low frequency is not suitable for electric-lighting directly. We should imagine that the Niagara Falls Power Company will not be anxious to undertake too much lighting, except at very much higher prices than they are charging for power. What they require are customers that will take current all day long, and, if possible, all night too, and not those that only want it two or three hours out of the twenty-four. If lighting commenced when the factories closed, the source of demand would be very convenient, but unfortunately, in the busy season, it begins early in the afternoon. The City of Buffalo, however, is going to be lighted from Niagara; at present, steam-engines to the amount of 3,000 horse-power, are at work driving the arc-lights there, and it will be a simple matter to replace these by alternate-current motors. In this case the frequency is of no account. Experiments made by Professor Forbes show that a 16 candle-power 50-volt incandescent-lamp shows a flickering almost up to 25 periods per second, and up to 28 periods if it be over-incandesced. A 100-volt lamp shows a perceptible flicker up to 28 periods. With arc-lamps there is very bad flickering at 37½ periods per second; at 40 periods, it is still bad; at 45 periods, it is just possible to notice it on a printed page held close to the lamp, but it is not visible when reading at a distance of 10 feet. At 50 periods, the only means of detecting anything of the sort is by looking directly at the arc; nothing is seen when reading a book, either with the opal shade on or off. In the lamp tried the current was 14.2 ampères, the pressure 26 volts, and the carbons Siemens and Halske's best cored variety.

The efficiency of transformers in relation to the size and cost also falls off as the frequency is lowered, but not so much as is sometimes supposed; the increased cost is not in proportion to the lowering in frequency, because a higher induction can be used. Mr. Steinmetz has shown that the loss due to hysteresis varies as the induction raised to the power 1.6, and it is this loss must be kept constant when the frequency is varied. Professor Forbes deduces from this law the fact that in any transformer, if the hysteresis loss is kept constant, its power of doing work varies in proportion to the frequency raised to the power of 0.4 (but it is probably unwise to increase the induction so much as to saturate the iron). It follows, by doubling the frequency, there is got out of the same transformer 132 units of work instead of 100. By quadrupling the frequency, 174 units are got. If the frequency be reduced one-half, the cost of a transformer is increased 50 per cent. Professor Forbes continued:

"The lowest price which has been quoted for large transformers is \$3.52 per horse-power, at a frequency of 42 periods per second. In halving the frequency the extra cost would, therefore, only be \$1.76 per horse-power. It becomes, then, a matter of inquiry whether the benefits to be derived by lowering the frequency in such a proportion would compensate for the extra expenditure as indicated. I am thoroughly convinced that the gain is far in excess of this amount. I shall have occasion to discuss the superior efficiency of motors at low frequency; and in most types of motors I think it safe to say that in passing from 42 periods to 21 periods, or varying the frequency in that proportion, we have a gain of at least 3 per cent in the efficiency of the motors. Neglecting altogether the increased value of the motors from this cause, there is 3 per cent more power at our disposal, which, at only \$10 per horse-power per annum, or, capitalized at 5 per cent, represents an increased value at \$6 per horse-power of the plant, against which we have the increased cost of transformers — only \$1.76. It appears, then, pretty certain that, from a purely economical consideration of the question, a lower frequency than any which has hitherto been adopted is advantageous."

Professor Forbes gave a general description of the machinery that is being constructed.[1] The turbines are each of 5,000 horse-power. They are placed at the bottom of a large pit, and their shafts are carried vertically to the surface, where they are connected to the generators. These have the armatures fixed, and inside the machines, while the fields revolve outside them, the fields being formed of a ring of iron with the poles projecting radially inwards. The armature coils are wound independently, and can be removed and changed. They are fixed in slots in the fixed armature. The field magnet is of forged steel, supported by a spider with eight arms; the pole pieces are bolted to the steel rim. The field coils are of copper-strip. The hub of the spider is fixed to the upper end of the shaft, which is supported by two bearings, each of which has four radial arms. Space is left between these arms, and also between the arms of the spider, for portions of the turbine-shaft to be lifted through, if necessary for repairs.

The evening of the 9th ult. was entirely occupied by the reading of the paper, and the discussion was deferred for a fortnight. At the time of writing it has not commenced, although before this reaches the hands of our readers, the first night's debate will be concluded. It is certain that a very hot controversy will be raised, for not only are many of Professor Forbes decisions debatable, but by giving his reasons at such length he has made many openings along which he can be attacked. It is on the question of frequency of alternations that the chief battle will rage. The engineers who have adopted higher standards, will come forward to defend them as applicable to all purposes, even to power-distribution at Niagara; they will certainly assert that their machines will work perfectly in parallel with their present frequency, and that no improvement would be found by adopting a lower figure. It will be a very interesting debate, and is likely to extend over several nights. — *Engineering.*

BOOKS AND PAPERS

THE composition of mortars used about a building is so often neglected in practice, that every intelligent study of the subject should be welcomed, even though the books which have been written on the subjects of lime and cement are very numerous. Somehow there is no lack of theory upon the subject, and of very excellent theory also, but so long as the mixing of mortar is left in the hands of ignorant workmen, just so long will theories continue not to be put in practice. The manual by A. H. Heath,[2] recently published, emphasizes the fact that without good mortar there can be no good building, especially in these latter days when so many forms of construction are devised in which the adhesive and cohesive qualities of mortar count for so much. It is probably safe to say that nowhere in the world is the mortar-work so poorly executed as in the United States. Every architect knows the almost impossibility of persuading masons to fill the joints in stone and brick work, and even the best written theories but accentuate the fact that the binding qualities of good, well-mixed lime or cement mortar are often sadly neglected. We are only just beginning to realize the possibilities of mortar and to apply to its use in building-operations the care in selection, in testing and in mixing, to which engineers have been accustomed for years. A few suggestions from Mr. Heath's book gives an idea of the possibilities which are so seldom utilized by the architect. Thus, the addition of finely powdered brick-dust, provided the bricks have been made of a plastic greasy clay and not of sandy clay, confers the property of hydraulicity upon pure lime. A method is sometimes adopted which consists in mixing together chalk and a plastic greasy clay, adding this mixture to the lime and thereby greatly strengthening the resulting mortar. Of course this is nothing more than a crude preparation of Portland cement, but if rightly used it serves to greatly increase the possibilities of lime. It

[1] See *Engineering*, vol. liv, page 782.

[2] "*A Manual on Lime and Cement, their Treatment and Use in Construction,*" by A. H. Heath. London: E. & F. N. Spon; New York: Spon & Chamberlain. Price \$2.50.

is sometimes claimed that the addition of a small amount of loam to lime-mortar will greatly increase its efficiency, the real fact being that the loam acts in two ways, first, by making the mortar more easy to work under the trowel, and secondly, by adding some of the elements which go to make up the strength of cements. Of course, however, all loams would not possess these qualities. In India it is customary to mix with the lime, whether for mortar or plastering, a proportion of coarse sugar syrup or molasses, adding about one-half pound of sugar syrup dissolved in two gallons of water, or from one-eighth to one per cent of the syrup added to the lime. About thirty-five per cent by weight of sugar syrup, liquid, may be used to the unit of lime for mortar mixing. The effect is to retard the evaporation of moisture, and it is generally considered that the syrup assists in setting the mortar and increases its strength by fifteen to twenty per cent, in three to four months. Mr. Heath's book is very clear and comprehensive in its treatment of the subject, being confined to fact rather than theories, and is especially good for its analysis of the different tests of cements and also for its elucidation of the chemical attributes of the various mortars and cements.

A COLLECTION of a hundred landscapes by contemporary painters, many of them reproduced from their own masterly drawings and others satisfactorily engraved on wood, the whole well-printed on good paper and sold at a moderate price, is surely something which many artists and art-lovers would be glad to get. And they can find it in "*Paysagis'es Contemporains,*" published in two parts, folio size, by the Librairie de L'art, Paris, at three francs each part. Black-and-white draughtsmen can learn much from a careful study of such noble specimens of their craft as those by Edwin Edwards, Grandsire, Rapin, Theodore Rousseau and Zuber, and Americans can take just pride in the fine drawing by their countryman Bloomer, from his own painting of the "Old Bridge at Grez." Though the greater part of the painters represented are French, there are examples of the work of German, American, English, Belgian, Dutch, Italian and Swiss artists.

A companion work to this is devoted to modern *genre* painters and includes excellent copies of the pen-and-ink work of De Nittis, of Jozef Israels, of De Neuville and Du Maurier, of Jean Beraud and Hubert Herkomer. Drawings in other mediums by Louis Leloir, Leon Lhermitte, Millet and Gerôme are also given. As the names cited show, this gathering also is international in character, and one of the best things about it, from a practical point-of-view, is the liberal scale on which many of the pictures are reproduced, full-page being the rule and not the exception in "*Peintres de Genre Contemporains.*"

WE remember, once upon a time, meeting a Boston architect then lately returned from a Western trip, during which he had tarried for a short time in Indianapolis, who spoke of its rawness and crudity and expressed the opinion that nothing good in art could come out of that Nazareth. Yet here we have *Modern Art*, a new quarterly hailing from that same city of Indianapolis, whose printing and paper is excellent both in taste and execution, and would be thought worthy of commendation if it bore the imprint of some leading Paris or London publisher. Much of its text, too, is well worth reading and the illustrations include, among others, admirable reproductions of works by Rossetti, Fortuny and Bonnat, while the many original head and tail pieces scattered through the pages are — most of them — really decorative.

THAT valuable series of art-biographies [1] "*Les Artistes Célèbres*" has lately been augmented by three new volumes, formed of M. Michel's work on the family of the Van de Veldes, M. Bouchot's on that of the Clouets and M. Lhomme's on Charlet.

M. Michel tells at more or less length of all the artists bearing the name of Van de Velde; Jan I, Jan II, Esaias and Willem the elder, but, as is right, devotes most of his space to the two greatest painters who bore that patronymic, Willem Van de Velde the younger, marine painter, and his brother Adrian, painter of landscapes and animals. Willem, first among Dutch sea-painters, and, therefore, first among all such save the English — it is fitting that the two nations which produced the best sailors should also give to the world the best marine painters — had a powerful influence on Turner, who said of one of his pictures, "Ah! that made me a painter." Adrian died young, yet left behind him a great number of works finished with much detail, and some admirable etchings of animals, in all this curiously resembling Paul Potter, whom he rivalled.

François Clouet, court-painter and *valet-de-chambre* to Francis I, as was his father Jean before him, has had ascribed to him portraits of his royal patrons, Francis II, Charles IX, and other eminent personages, but is better known by his pictures of Mary, Queen of Scots. The book which M. Bouchot has devoted to an account of his life and labors and those of his artist-relatives, contains also a chapter on Corneille de Lyon and another on the School of Clouet.

The volume on Charlet is by the same author, who prepared for this series the life of Raffet, who was Charlet's pupil and who surpassed his master. The glorification of the grenadier, the Old Guard, the veterans of the First Napoleon, was a favorite theme with Charlet, whose work as a painter is less important than his lithographs, of which he executed nearly two thousand. Various examples of these — patriotic and satirical — are reproduced in M. Lhomme's interesting monograph, which, like the others of this series, is well-printed on good paper and lavishly illustrated.

[1] "*Paysagistes Contemporains,*" Paris: Librairie de L'art; "*Peintres de Genre Contemporains,*" Paris: Librairie de L'art; "*Modern Art.*" J. M. Bowles, Indianapolis, Ind.; "*Les Van de Veldes.*" par Emile Michel, Paris; Librairie de L'art: "*Les Clouets,*" par Henri Bouchot, Paris: Librairie de L'art; "*Charlet,*" par F. Lhomme, Paris: Librairie de L'art.

SOCIETIES

DIRECTORS' MEETING OF THE AMERICAN INSTITUTE OF ARCHITECTS.

THE next meeting of the Board of Directors of the American Institute of Architects will be held in New York on Monday, January 8, 1894. We have been requested by the Secretary to remind all persons intending to apply for membership to send their applications to the Secretary at Providence, so that they will reach him by the 4th of January. Drawings may be sent directly to the rooms of the New York Chapter of the American Institute of Architects, 18 Broadway, instead of sending them to Providence.

THE ILLUSTRATIONS

[Contributors of drawings are requested to send also plans and a full and adequate description of the buildings, including a statement of cost.]

CONGREGATIONAL CHURCH, PROVIDENCE, R. I. MESSRS. CARRÈRE & HASTINGS, ARCHITECTS, NEW YORK, N. Y.

[Gelatine Print, issued with the International and Imperial Editions only.]

COMPETITIVE DESIGN FOR THE RIDGE CLUB, BAY RIDGE, L. I. MESSRS. PARFITT BROS., BROOKLYN, N. Y.

THE estimated cost of this building was $20,000.

STRONG HALL, VASSAR COLLEGE, POUGHKEEPSIE, N. Y. MR. FRANCIS R. ALLEN, ARCHITECT, BOSTON, MASS.

DETAILS FOR THE CORN EXCHANGE BANK, NEW YORK, N. Y. MR. R. H. ROBERTSON, ARCHITECT, NEW YORK, N. Y.

[Additional Illustrations in the International Edition.]

FOUNTAIN AND PORTION OF THE GERMAN GOVERNMENT BUILDING, WORLD'S COLUMBIAN EXHIBITION, CHICAGO, ILL.

[Gelatine Print.]

INTERIOR OF THE CONGREGATIONAL CHURCH, PROVIDENCE, R. I. MESSRS. CARRÈRE & HASTINGS, ARCHITECTS, NEW YORK, N. Y.

[Gelatine Print.]

HALTON, HERTS. — THE RED ROOM.

RESIDENCE AT ERDINGTON, ENG. MESSRS. ESSEX, NICOL & GOODMAN, BIRMINGHAM, ENG.

THIS residence has recently been erected for Dr. Donovan. The building is faced with red pressed-bricks, and has red Hollington stone and Bracknell rubber brick dressings. The roofs are covered with brindled tiles.

DRESDEN, AFTER A DRAWING BY SAMUEL PROUT.

COMMUNICATIONS

[The editors cannot pay attention to demands of correspondents who forget to give their names and addresses as guaranty of good faith; nor do they hold themselves responsible for opinions expressed by their correspondents.]

WALLS FOR A COURT-HOUSE.

MEMPHIS, TENN., December 4, 1893.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Will you kindly give me the following information through the columns of your valuable journal, of which I am a great admirer:

I have a court-house to build, the first story of which is fourteen feet in the clear; the second story is twenty feet in the clear; and the court-room has a clear span of sixty feet for the trusses. Now, will you kindly inform me what should be the thickness of the brick walls on the first floor, also, the thickness of those on the second floor and if that part of the wall should be strengthened by making the wall thicker at the points where the trusses rest; also inform me how wide the breast of the pilasters should be in case you recommend them. What distance apart should trusses be placed?

By answering this as soon as possible, you will greatly oblige,

Yours truly, Yellow Fever.

[The necessary thickness of the walls depends on so many considerations, such as the quality of the brick and the mortar, the character and spacing of the trusses, the way in which the first story is divided, and the manner in which the second-story floor-beams are tied to the walls, that it would be impossible to give any safe rule. However, as a guide, we may say that with the best bricks, thoroughly bonded, and laid in cement, with the trusses designed so that there could never be any thrust to them, and spaced not more than twelve feet from centres, the first story divided by brick cross-walls, and the court-room not over one hundred feet long, we might, if the utmost economy were necessary, feel justified in making the first story outside walls twenty inches thick, and the upper walls sixteen inches thick, with pilasters twenty inches thick, and at least three feet wide on the face, under each truss. To make this safe, however, the wall must be solid, not faced with pressed-brick. If such facing is used, the thickness of it must be added to the rest, as it is of little or no use in making the wall stable, or aiding its supporting power. As to the trusses, much depends on the design of the roof, but we should not, with wooden trusses, wish to set them more than twelve feet apart from centres. — Eds. American Architect.]

NOTES AND CLIPPINGS

The Marble Staircase in the Maine Capitol. — It seems that there is additional work for the repairer at the State House at Augusta. It turns out that there is a weakness in the support of the base of the marble stairway which is so admired by visitors. It is the main stairway which one takes to reach the second floor of the new wing. A prominent official states that when the stairway was placed in position the iron girder which supports it settled in the centre about one inch. This, necessarily, would cause a drop of about an inch where it connected with the landing at the top. To make the stairway come flush with the landing the foundation beam was jacked up an inch, raising the steps. It is said that Architect Fassett also examined this weakness at the time he looked over the library floor, and that measures will be taken to strengthen the stairway by placing two iron pillars beneath the girder in the basement, which can be handily done. The stairway is a very heavy structure of stone and iron, which, added to the ponderous fireproof floor of tile and marble, made too much for the beam. — *Lewiston (Me.) Journal.*

An Ancient Canal discovered in the Crimea. — An Odessa engineer, by name Melhukoff, has lately made a remarkable discovery in the Crimea, in the shape of an immense ancient canal, which the discoverer accounts as one of the wonders of the world. The length of this work is nine kilometres, depth ten metres, and breadth about five metres. It passes alongside the present town of Perekope, and near the ancient Greek town of Neapolis. Both Pliny and Strabo write of this great canal. In Theodosia the gigantic head belonging to a statue of Hercules has also lately been discovered. There is little doubt that the Crimea and the Caucasus contain many undiscovered archæological treasures. — *London Exchange.*

German Process for Drying Wood. — The London correspondent of the Manchester *Courier* hears that a German process for drying woods has been tried, and apparently with some success, by a firm of Canadian lumbermen. It consists briefly in placing the timber for twelve days in chambers heated by steam, and then in another room to dry. The plan, it is said, entirely gets rid of sap, and has been found most efficacious with juicy woods like beech and birch. It is certainly the case that timber prepared by this means is largely used in Germany, and particularly in Bavaria. At the same time, it is stated that this artificial seasoning is not nearly so efficacious as that produced by natural means. Woods thus forced into maturity are apt later on both to warp and to rot. The constructors of the German Navy have altogether declined to use wood so prepared, though it has been found useful for fencing and other kinds of cheap carpentry.

Boring to a Depth of 6,560 Feet. — The deepest boring of which we have any knowledge up to the present time is at Parvschowitz, in the district of Ribnik in Western Silicia. The depth attained is 6,568 feet, and the diameter of the hole is only 2.75 inches. The work has been temporarily stopped in order to lower special thermometers, which have been made with great accuracy, into the hole for the purpose of obtaining the temperature at different depths. The boring will then be resumed, and it is hoped that a depth of 8,200 feet will be reached. The method of operation is that the Hammersmann tubes are used, great lengths of which can be operated at once. The first tube has a diameter of 11.8 inches, and is provided at its lower end with a diamond-cutting edge which acts as a drill. The pipe is then screwed, as it were, into the ground, and when it has been entered completely a small special mechanism permits the cutting-off of the column of *débris* at the base, whence the core which has been formed in the interior of the tube, and which exactly represents the geological formation, is removed. This is then raised to the surface of the ground and the diamond-pointed cutting edge is raised to the surface and a second and longer tube screwed on, having as its outside diameter the inside diameter of the first one, and it is also provided, on its lower extremities, with a new diamond-pointed cutter. This tube is then dropped into the hole, it is stopped by the first boring, and they begin to screw it down as in the case of the first. When the two tubes are thoroughly imbedded in the ground, the first operation is repeated and the core withdrawn, and thus by successively screwing on to the end of the tube one whose external diameter is equal to the internal diameter of the preceeding one, the work is carried on. — *Revue Scientifique.*

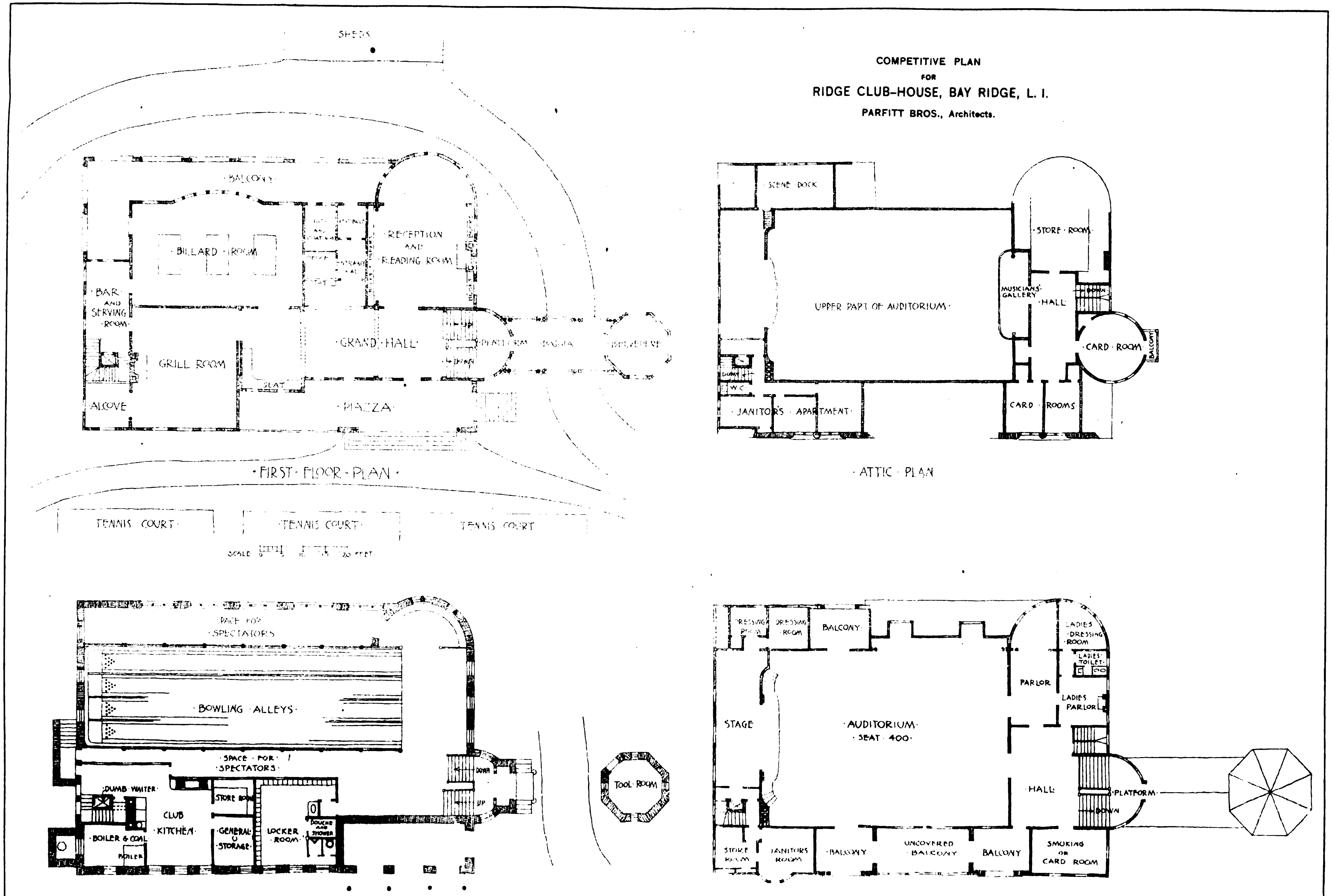
Method of Washing Smoke. — The Birmingham *Gazette* states that the directors of the Birmingham Mint have adopted a practicable method of remedying a long-endured nuisance. The thick, black volumes of smoke proceeding from the high chimney-stack of the local mint have long been a serious annoyance to the district, and the shopkeepers in particular have suffered to no inconsiderable extent from the same source of trouble. The Mint Company have suffered perhaps as largely as any one in the vicinity, and has had on many occasions to answer the complaints of the Health Inspectors and to pay heavy penalties incident to the proceedings that have from time to time been taken. Recently, a gentleman who owns a large joinery establishment at Newbury, Berkshire, expressed his willingness to wash the smoke by an original process of his own. The invention which he has introduced at the mint has met with the entire approval of the directors of the company, and has also given satisfaction to the health authorities of the city. An opportunity was afforded a representative of the *Gazette* of inspecting this extraordinary arrangement of making black into white. First the smoke is drawn from the stack by a powerful fan, and it is then forced through a revolving cylinder into a tank filled with water. Perforated beaters are affixed to the back of the cylinder, and these drop into the water and scrub or wash the smoke, which is put back into the chimney in the form of a perfectly pure vapor. The solid carbon which is washed from the smoke is brought out at the bottom of the tank all bubbling and boiling over, to all appearances a black foaming froth. The arrangement of the apparatus allows an inspection of the washing-process, and of the vapor, which, after the cleansing has been performed in the tank below is perfectly white and odorless, and is thrown through the chimney into the air as steam. It is an interesting fact that the black extract is admirably adapted for use in the composition of paint and printing-ink, while the ammoniated water remaining after the process of washing possesses the properties of a powerful disinfectant.

The Insurance History of the White City. — We have many pleasant recollections of the great Fair, says *The Investigator*, and one not the least is its insurance history. From the first we insisted that the insurance men of the country should lend aid and countenance to the project, because without insurance the Fair would have been impossible. We realized also that it would be possible to destroy all the insurance companies of the country if they wrote freely on the values that would be piled up in the White City and there should come a destructive conflagration. While many of our contemporaries were insisting that, owing to the character of the buildings, there would surely be a great loss, we were asserting that Chicago pluck and energy would prevent anything of the kind. The buildings grew rapidly and insurance was called for. The managers of the Exposition promised all possible protection, and agreed to appoint a committee of insurance men to have supervision of the insurance interests, and also agreed to abide by suggestions made by such committee. Accordingly the committee was appointed, and known as "The Insurance Auxiliary Committee of the World's Columbian Exposition." Its members were: Fred S. James, chairman; R. S. Critchel, O. W. Barrett, W. A. Alexander, J. H. Moore and R. A. Waller. This committee worked early and late during the constructive period of the World's Fair, and when that was past was ever on the alert. It caused the management of the Fair to put in trained firemen, and not amateurs, to protect the grounds, and all during the exposition there was on hand a fire-department superior to that in the service of cities of 50,000 to 100,000 people. These men were equipped with the best apparatus. A fire-boat was built especially for service in the lagoons; the Columbian Guard was under military discipline, and was available for fighting fires. The committee insisted that fire-stops should be placed under the floors of the enormous buildings; that hollow columns be filled, that the electric-light wires be installed after the most improved methods, that the petroleum fuel supply-plant be reconstructed and a thousand other things be done. All these things took time and cost large sums of money, and meanwhile insurance was being rapidly taken out on the buildings and contents. Millions of dollars were written by the companies, and in many quarters there were fear and trembling. Not so among the Chicago men. They insisted that the companies could safely write on the buildings at a reasonable premium, and they are now enjoying well-earned satisfaction over the outcome. In the midst of their labors O. W. Barrett, one of the most earnest workers on the committee, died, much to the regret of his co-laborers. David Beveridge, who acted as assistant secretary of the committee during the constructive period, and whose experience and attention were of great value, resigned, and was succeeded by S. T. Collins. The cold-storage warehouse horror was regretable, but the committee was in nowise to blame therefor, and the insurance companies suffered but little on account of the disaster. The committee, in order to be on the safe side, devised a sliding scale for the decrease of the policies on the buildings at the Fair, and as a result there is now but one-fifth of the value of the policies written on the buildings in force, and this expired December 1. The companies have received from the Exposition company over $250,000 in premiums, and the losses paid are less than $10,000. This is a most excellent result, and we join with the auxiliary committee in rejoicing that they are able to give so good an account of their stewardship.

S. J. Parkhill & Co., Printers, Boston, U. S. A.

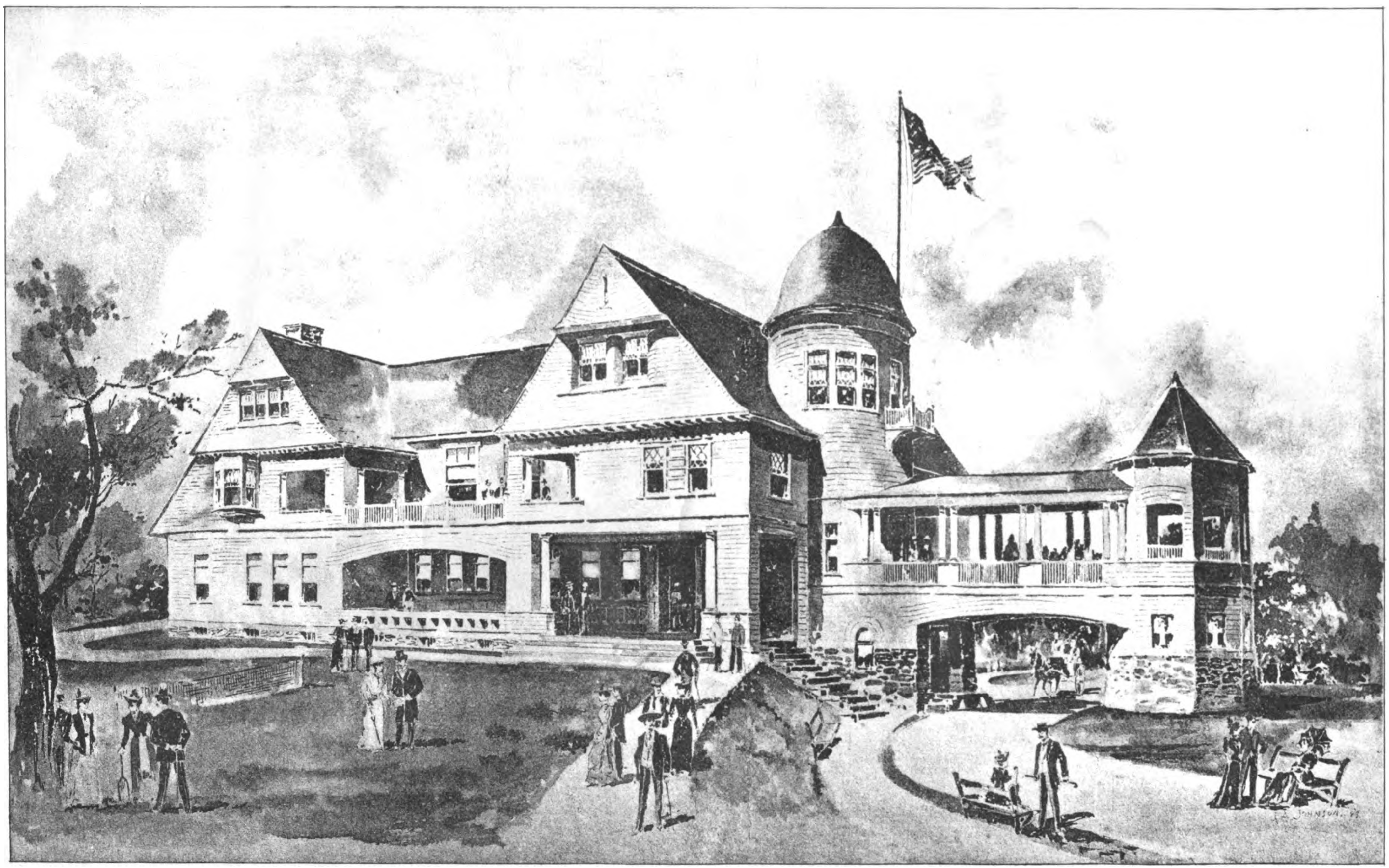
COMPETITIVE PLAN FOR RIDGE CLUB-HOUSE, BAY RIDGE, L. I.

PARFITT BROS., Architects.



BASEMENT PLAN

·SECOND·FLOOR PLAN·



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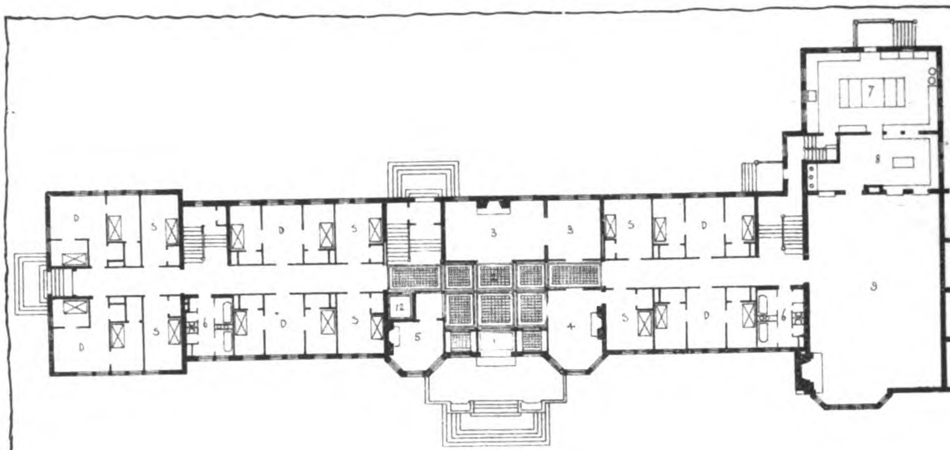

· FIRST STORY ·

1- VESTIBULE.
2- HALL.
3- PARLOR.
4- MATRON'S PARLOR.
5- RECEPTION ROOM.
6- TOILET.
7 KITCHEN.
8 SERVING ROOM.
9 DINING ROOM.
10 LINEN.
11 SERVANTS ROOMS.
12 ELEVATOR.

S- SINGLE ROOM D- DOUBLE ROOM.

✱ STRONG HALL ✱

· NEW DORMITORY FOR VASSAR COLLEGE

· POUGHKEEPSIE · N · Y ·

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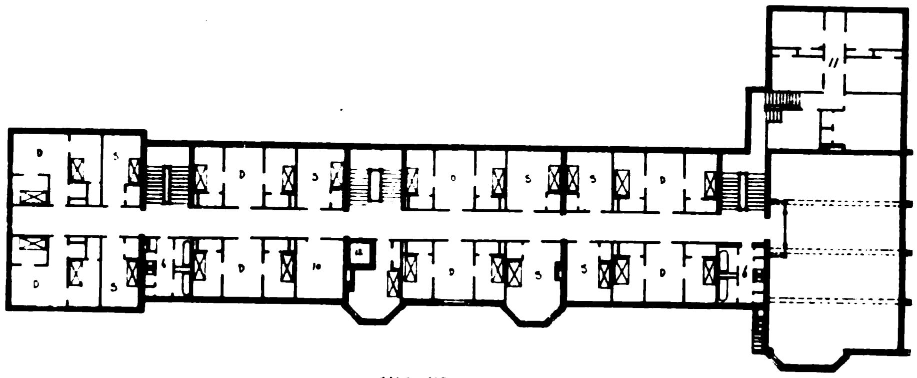

• SECOND STORY •

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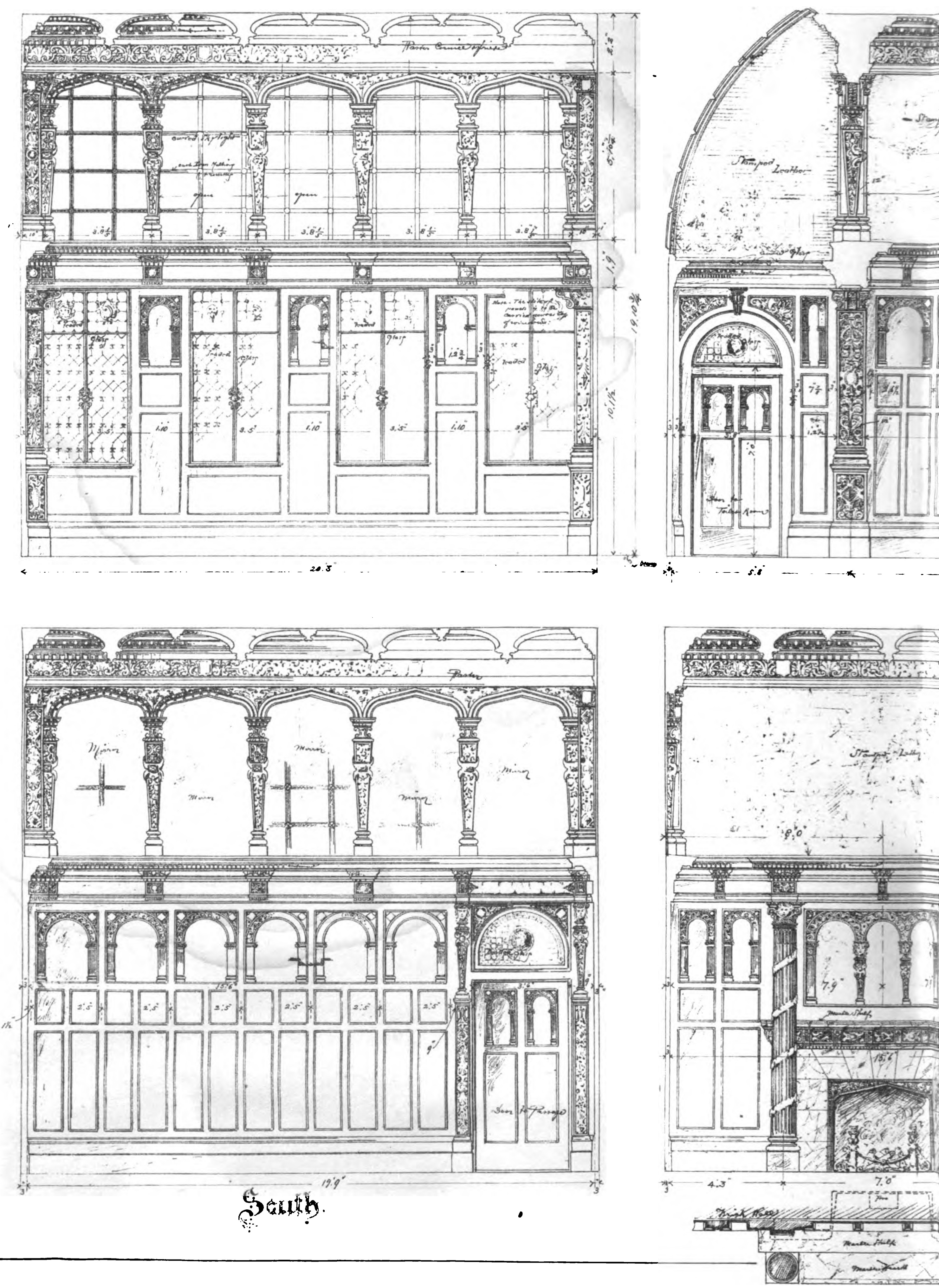
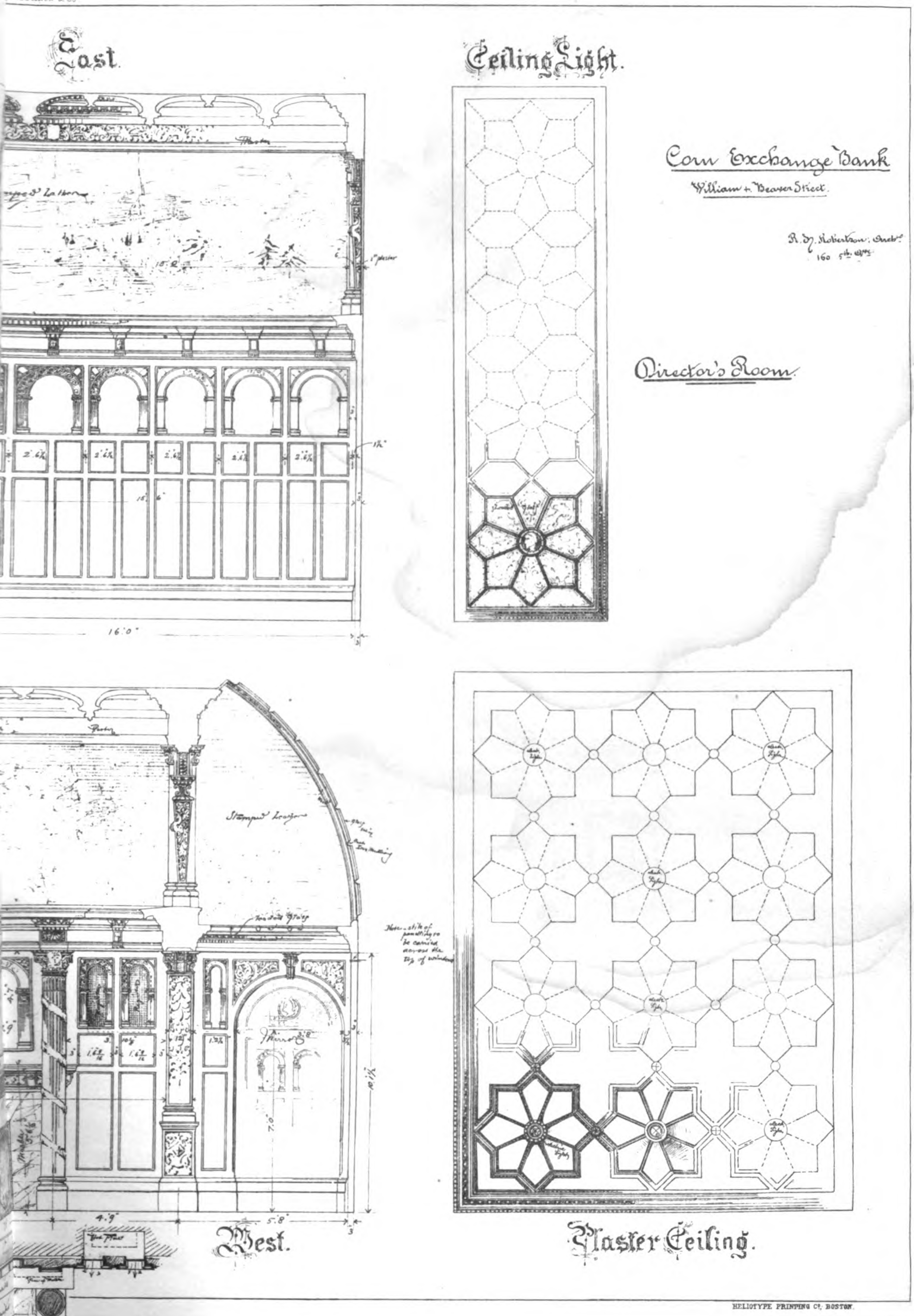
North



South



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DECEMBER 23, 1893.

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NOTWITHSTANDING the general condition of depression and distrust under which the business of the country seems to labor, and the great number of people out of employment in the cities and manufacturing towns, there are signs that the next season will be a good one for building, unless the walking-delegates should see fit, for purposes of their own, to prolong the distress of their constituents by the mischievous tricks which have so often served to turn capital away from building investments. Among the favorable signs, the most conspicuous is, perhaps, the firmness with which the value of land in the principal cities has been maintained throughout the season of depression in other property, and, of late, the unusual number of transfers which have been made, at good prices. It is tolerably obvious that a man who buys vacant land, at about the same price that he would have had to pay for it a year ago, in preference to stocks that would cost him only two-thirds what they would have been worth a year ago, thinks that the land will be the better investment of the two, and the numerous instances of subdivision, at a profit, of large lots bought in this way by the richer operators, indicates, both that an increased number of investors is coming to the same way of thinking, and that the buyers of the small lots intend to improve their holdings. Another favorable circumstance is that building in most of the large cities has been quiet for several years, so that, in normal times, there would, before this, have been a considerable demand for new houses and stores. Already, although the wish to economize, and the dulness of business, have driven many families from the city to the cheaper accommodations of the suburbs, the city houses of a moderately expensive class are well taken up, and more must be provided for before long, and with them the new stores and other semi-public buildings which the growth of population makes necessary. Again, every architect must have observed that an unusual number of churches have been projected recently. For about ten years, very few new churches have been built, but the tide has certainly set in again, and as the most contagious among architectural fashions is that of church-building, we are likely to see within the year, a great many rickety, ugly and inconvenient wooden churches exchanged for structures more in accordance with modern taste. It is notorious that the erection of a new church in a town usually gives the signal for a good deal of other building, and remodelling of old work, so that in the country, as well as the cities, the prospect seems encouraging. It is, however, well to recollect that the anticipations which now seem justified may easily be brought to nothing by the ill-judged interference of trade combinations with natural laws. Unquestionably, the people who have money to put into building next year have a right to expect that they can build cheaply. Every one knows that iron and steel, which will be used in increasing quantities in city building, are cheaper than they have been for years, but that, even at present prices, they pay a reasonable profit to the manufacturers. It is also probable that tariff changes will result in a reduction in the cost of spruce and some other woods, and in that of lime, cement, and perhaps other materials, which will amount to a substantial sum in the total cost of an ordinary building; while labor, notwithstanding the bravado of the foreign demagogue, is not likely to advance in price while the cost of the necessaries of life is being reduced, and while the almshouses and city soup-kitchens are thronged with good mechanics and their families, whom the blustering and haranguing of the walking-delegates has not saved from being thrown out of work. Those who are obliged to calculate closely the interest on their expenditure must take into consideration all these things. If they think that they can build at a cost which will probably give them six per cent net income from their investment, they seem likely, for the next two or three years, to prefer this sort of investment to any other, much to the advantage of the building world; but if they are met, as soon as the building season begins, by arrogant combinations of material-dealers or workmen, with demands which, if granted, would increase their investment so that it would not pay more than four or five per cent, and, if not granted, would subject them to months of controversy, delay, annoyance and loss, they are not only likely, but certain, to abandon their projects, and employ their capital in some other way.

IT will be remembered that the parents of the late Henry O. Avery presented to Columbia College, in memory of their son, a fine architectural library, which now comprises more than ten thousand volumes, and is known as the Avery Library. The collection is kept in a special alcove, which it is intended to mark by a memorial tablet. The tablet itself has already arrived at the College, and, although its permanent place is not yet ready, it has been set up temporarily in the great hall of the College Library, where it will undoubtedly attract much attention. The tablet is by the French sculptor, Chaplain, and is very prettily composed — a rectangular panel, or rather plate, surmounted by a simple pediment, something after the fashion of a Greek stele, presenting in the upper left-hand corner a medallion-portrait of the regretted young architect, while a seated figure of Architecture, with its eyes raised toward the portrait, occupies nearly all the space between the lower right-hand corner and a diagonal, the intervening portion giving room for an appropriate inscription. The figure is seated on a stone, carved in the shape of a Corinthian capital, and beyond it, near the edge of the panel, rises the straight trunk of a laurel tree, which extends toward the medallion a leafy branch, from which a spray runs over into the pediment. The whole affair is not much more than three feet high, but the delicate simplicity, — one might almost say naïveté — of the idea, together with the beautiful design and execution, make it charming.

A NEW sort of street pavement is under trial in Rochester, N. Y. The City Surveyor of this pretty town, Mr. J. V. McClintock, conceived the idea that if a macadam pavement could be made water-proof, so as to prevent the soaking and softening of the ground under it, a great improvement might be made in it, at a small expense. As an experiment, therefore, he macadamized a street in the central part of the city with broken trap-rock from the Hudson River Palisades. The stone used was rather small; the largest pieces would go through a one-and-one-half inch ring, and everything was used but the dust. This material was laid over an old macadam pavement, which was previously picked up, and the dirty stones removed. After rolling the pavement thoroughly with a steam-roller, it was grouted with a mixture of one part American Portland cement to one part sand, with water enough to bring it to the consistency of thick cream. The pavement was first thoroughly wet, and the grout then poured gently over it from pails. One barrel of cement, costing two

dollars and fifteen cents, was sufficient for eight and seven-tenths square yards of pavement. After the grout had been allowed to set for twenty-four hours, sand was thrown on the surface, and water sprinkled over it. Traffic was kept off for nine days. Although it is impossible to tell as yet how the pavement will wear, Mr. McClintock, in a letter to the *Engineering Record*, says that it is smooth and neat, and easily cleaned, and is popular with drivers. The principle of this pavement is not altogether new. For some years the Boston streets, in accordance, it is said, with a plan devised by the Superintendent of Streets, have been paved with granite blocks, the interstices of which have been filled, after laying, with hot gravel and tar, making the surface quite water-proof. This improvement has added greatly to the cleanliness and durability of the Boston pavements, at a small expense. Whether Mr. McClintock's Portland-cement grouting will do for macadam what the coal-tar concrete does for granite blocks is still a question. From our experience of Portland-cement grout, we should be strongly inclined to leave out the sand, and use the cement neat, and to keep traffic off it, if possible, for a month, wetting the pavement occasionally in the meantime. Sand in Portland-cement grout is disposed to separate from the cement, and we should think that it might hinder the cement from penetrating the smaller interstices. However, the idea seems a promising one, and, if it answers tolerably well in Rochester, no doubt improvements can be made later. Possibly the broken stone itself, instead of being laid dry and grouted, might as cheaply be laid already mixed with cement and sand, in the form of concrete, and immediately rolled. Such concrete would bear a large proportion of sand, which would reduce the expense.

A GOOD deal is being said in the newspapers just now about propelling boats on the Erie Canal by means of electric currents, transmitted by wires and trolleys, and it may be interesting to say that, according to *Le Génie Civil*, this system has already been in operation for about a month on the Canal de Bourgogne, in France. Most people know that one can travel almost all over France, as well as Belgium and Holland, by canal, and canal navigation is one of the most important subjects of study among French engineers. The Canal de Bourgogne crosses the ancient Province of Burgundy, connecting the Seine with the Saône, and thus affording inland navigation between Paris and Lyons, and between the Channel and the Mediterranean. There is a high ridge of land between the valleys of the Seine and the Saône, and the Canal crosses this by means of a series of locks on each slope, connected, at the summit, by a piece of level canal, about four miles long, half of which runs in a deep cutting, while the middle half forms a tunnel, about two miles long. To save a part of the enormous expense of cutting through the ridge, the tunnel is made only just large enough to admit the passage of a boat, without affording room for a tow-path at the side, and it is necessary to provide means for propelling the boats without using horses. When the Canal was first built, the passage of the tunnel was made with the help of a chain, secured to the rock overhead. The boatmen laid hold of this chain, and tugged until they brought the boat through. In 1867, this primitive arrangement had become inadequate to the demands of the traffic, and, instead of it, a chain, four miles long, was laid in the bed of the Canal, in such a way that it could be taken up and passed over rollers fixed in the bow and stern of a boat. A tug-boat was then built, provided with a steam engine, and gearing, by which the chain was clutched, and the boat pulled along, drawing after it a string of ordinary boats. This answered well, but the cost of coal for the service is about a thousand dollars a year, while the wear on the chain is considerable. For these reasons, in connection with the fact that a waterfall is available near each end of the line, it was decided to substitute electric currents, generated by the waterfalls, for steam in the tug-boat, and the installation, planned by M. Galliot, of Dijon, accomplishes this result very successfully. The current is generated by dynamos driven by turbine wheels, and conveyed by bronze wires to the canal. Two wires are used, one positive and the other negative, and two trolleys close the circuit through the motor on the boat, which drives the machinery pulling upon the chain. The movement is said to be gentler and more regular than that derived from the steam-engine, and, as the water-power costs nothing, all the expense of coal is saved, while the spare current from the dynamos serves to light the tunnel.

AN extraordinary exhibition was held a few weeks ago in Boston, and, later, in New York. It seems that one of the expeditions now engaged in exploring Egypt, while at work near the Fayoum, discovered a collection of tombs, in which were deposited vast numbers of mummies, dating from the Ptolemaic and Roman period, between 200 B. C. and 200 A. D. It will be remembered that, from the earliest times, the Egyptians endeavored to recall, in the form which they gave to the cases or wrappings which enclosed the bodies of their dead, the features of the deceased persons, and, when the family could afford it, portrait statues were usually placed in the tomb with the mummy, in order that the "appearance," or external form, of the deceased might not be lost before his soul returned, after its five thousand years of wandering, to be reunited to the body. In the later times, when Greek ingenuity had to a certain extent taken the place of tradition, the dead person's "appearance" was preserved by simpler, and, in a certain way, more effective means. Instead of the conventional carved mask on the mummy case, explained by a beautifully executed portrait statue near by, or a picture on the walls of the tomb, a piece of realistic portrait painting was attached to the mummy itself. It will be remembered that, a year or two ago, a quantity of plaster masks were found in an oasis in Upper Egypt, painted in the most realistic manner, and evidently portraits, once attached to mummied bodies. In Lower Egypt, instead of plaster masks, flat portraits, painted on panels, were enclosed among the wrappings of the head of the mummy, in such a way as to look out from among their folds, as if the real person were still there. The Fayoum excavations brought to light a great quantity of these Græco-Roman-Egyptian portrait panels, and Herr Graf, who was attached to the expedition, conceived the idea of collecting some of the best of them, and sending them to the Chicago Exhibition. They arrived there rather late, and, for want of a better place, are said to have been displayed in one of the Old Vienna buildings, in the Midway Plaisance, where few people seem to have discovered them. After the close of the Fair, they were sent to Europe, and were shown in Boston and New York only on the way.

AS paintings, the panels were of very unequal merit. All of them were coarsely executed, and most had a rather unpleasant effect, the skin being pallid, and the eyes "*cernés*," with dark rings around them, but it is quite probable that these peculiarities were intended to heighten the lifelike effect of a face nearly hidden by drapery, and seen by the light of a torch, so that they should not be regarded as the result of lack of skill, but the contrary. In fact, although the proportions of the faces were not well kept, many having absurdly low foreheads, there was a vigor of portrait effect about them which showed a practised hand, as if the artists who painted them turned them out by the dozen, as it is quite probable that they did, and warranted a staring likeness into the bargain, as is, also, not improbable. Anything like delicate, artistic feeling could hardly be looked for in such works, and it was certainly not to be found, although some of the faces, particularly of young girls, were refined and pleasing. Perhaps the most striking characteristic of the faces, or rather, of the persons whom they represented, was the want of any striking characteristic. Except for the large proportion of negro faces, and the peculiarities of costume and of treatment, the pictures would pass for a collection of cheaply-daubed portraits of the inhabitants of New York. Naturally, at the time of the Christian era, Lower Egypt was filled with a motley population of Greeks, Romans, Jews, Egyptians of the old stock, and Negroes, so that the variety of complexion and feature in the portraits corresponded closely with that to be found in a modern civilized city, and certainly gave an unusual interest to the collection. Another interesting point was the excellent preservation of the colors, which were put on with a wax medium, and were, apparently, as fresh as on the day they were laid in place. Even the brush-marks were perfectly distinct, and the gold-leaf which indicated coronets or other ornaments in many of the portraits was nearly intact. It would be useful to our decorative painters to have some of the colors analyzed, but the most important fact, that, with a wide range of pigments, painting in wax medium remains unchanged in a dry climate for two thousand years, is, by these remarkable pictures, well established.

MUSEUM OF NATURAL HISTORY.[1] — I.

A NATURAL HISTORY MUSEUM, while an exhibition building, differs materially from a museum of painting or sculpture. The latter, designed to preserve the works of the past for the purpose of perpetuating the history of art, also receives articles that are of secondary importance and not absolutely indispensable to the main object of the collection, stray bits from various monuments that have disappeared. These minor works, forming the archives of the history of art, do not always require to be exposed in the best light. In a museum of Natural History the demands are quite different. For scientific study the smallest object is important and sometimes it is of cardinal importance; nothing can be sacrificed. Hence, in a museum of this kind it is necessary to have a simple disposition of the rooms, and they must be easily accessible and abundantly lighted. Then, with the specimens arranged with the essential degree of order, the visitor will be able to search through a vast collection with the same facility that he would consult a dictionary.

Simplicity of disposition and easy means of access are moreover requisite in case of crowds. The galleries are intended for the public, and every individual must be able to get instruction in them. Clearly, a wide difference must exist between an institution of this kind and a laboratory for the sole use of scientists or experimenters. A laboratory is a place for work; the rooms may be small, for they are designed for a few persons only. The conditions are just the reverse in an exhibition gallery.

First, therefore, the general arrangement of a Natural History Museum must be such as to admit of ready circulation. The apartments must then be disposed lengthwise; a single door, even if central, being inadequate, each room must be provided with a separate entrance and exit; besides, from an architectural standpoint, it is always better to give one entering an apartment as great a perspective as possible, rather than to present it from the middle of one side. As for small square rooms, they are not very convenient for circulation and the corners, which are necessarily poorly lighted, always offer some difficulties in the arranging of the specimens.

It is also essential that the collections of specimens, which are often very delicate, should be enclosed in glass-cases, and these must, of course, be well-lighted; the supports and sashes must be as light as possible in order not to obstruct the light: iron is the best material for them.

The stairways communicating with the different stories must be commodious and convenient for every one, for children and for the aged; they cannot be steep and must be so located as to give easy access to the various galleries of the edifice. Lastly, as it is pleasant for the visitor to get a general view of the collections, tribunes should be introduced at different favorable points, to enable him to enjoy glimpses of the whole and also to aid him readily to reach any desired spot.

The Jardin des Plantes at Paris occupies a vast site, the buildings on which have been put up at different periods and set somewhat at hazard. They serve very diverse purposes, it is true, and require very unequal areas. The menagerie proper is on the northwest, while on the southeast, on the grounds beyond the Rue de Buffon, are the laboratories, especially all those constructed in recent years.

The main entrance to the garden, Place Walhubert, is in front of the Pont d'Austerlitz, though not on its axis; it gives immediate access to a very long parterre bordered on either side by two beautiful rows of trees and reserved more especially for botanical researches; it is between the menagerie and the laboratories. Near the farther extremity are found, on the left, on the Rue de Buffon, a long building constructed by M. Rohault de Fleury, containing geological and mineralogical galleries, and, on the right, backed by the two labyrinths, the conservatories. Previous to 1877, the end of the parterre, along the Rue Geoffroy-Saint-Hilaire, was occupied by an isolated building dating from the time of Louis XVI, possessing no architectural value and standing at an angle to the general direction of the parterre, of the conservatories and of the geological galleries. This edifice, called the Cabinet of Natural History, contained in poorly-lighted apartments the zoölogical collections.

It was in the latter part of 1871, that, on the complaints of the professors of the Museum, who were unable to expose the constantly increasing collections in the already over-crowded rooms, the Government requested the architect of the Jardin des Plantes, M. Jules-André, to submit two plans of enlargement for consideration. In 1872, these were ready. One simply provided for the additions to the galleries of Comparative Anatomy near the Rue Cuvier; the other included designs for a new building to be erected in front of the old Cabinet of Natural History, a spacious building capable of accommodating all the existing collections and with ample room for any new

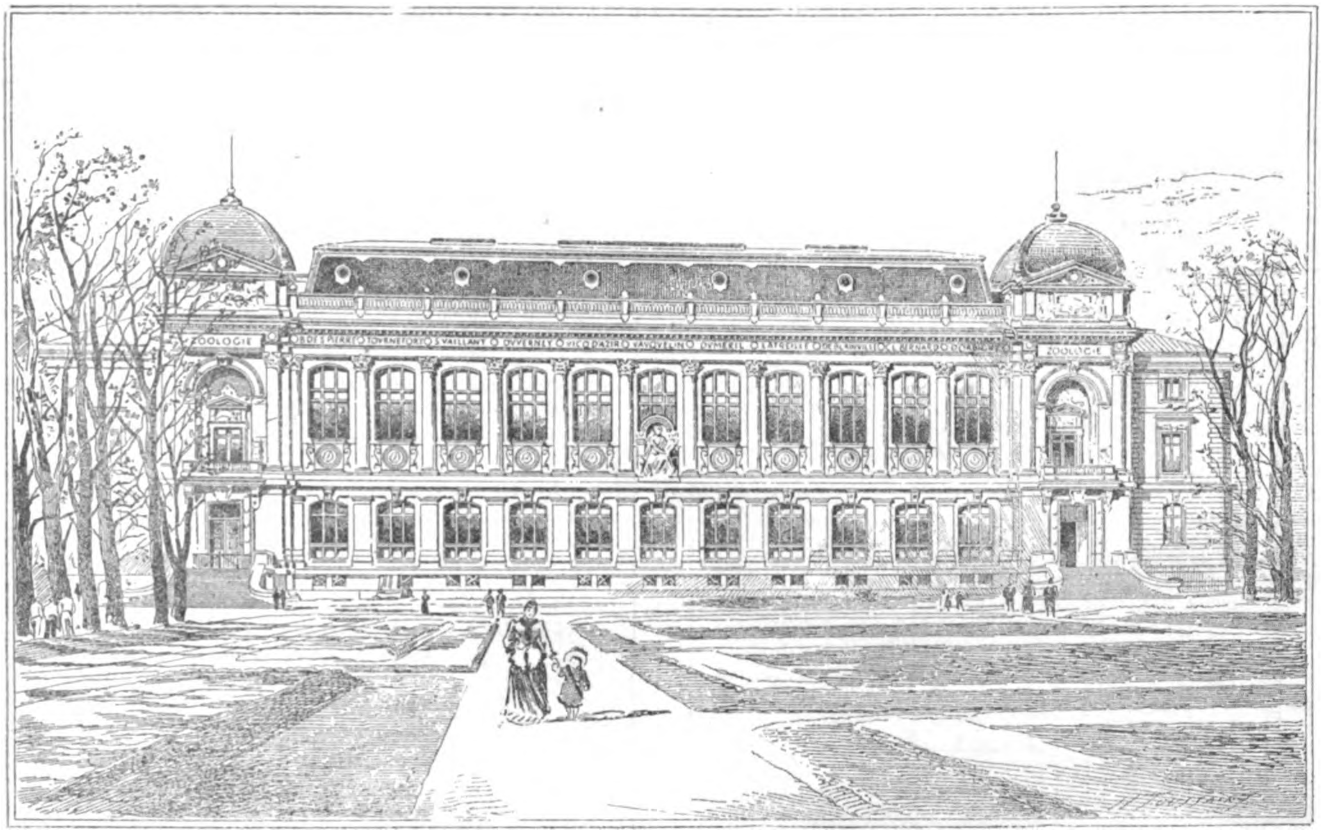


Fig. 1. Façade of the Zoölogical Galleries.

[1] From the French of Pierre André, in Planat's *Encyclopédie de l'Architecture et de la Construction.*

acquisitions that the Museum would be apt to make. That year (1872), M. Thiers, then the President of the Republic, made a visit to the Jardin des Plantes. The second plan pleased him; it was presented for consideration, and the designs were approved at a meeting of the professors of the Museum and by the general board of overseers of civil constructions. The sum of seven million francs was voted by the Chambers for the erection of the new galleries and a first instalment of 400,000 francs made it possible to begin work on them in 1877. They were twelve years in process of construction; the zoölogical galleries were formerly opened July 25, 1889. The site was happily chosen. Before their erection, one was in doubt as to where was the central point of the Museum and what was the main object of interest, where, in short was the monumental embodiment of the scientific power of such an establishment. At present, the new edifice marks the centre; it forms a successful connection between the conservatories and the geological galleries.

The visitor has before him at once the three kingdoms of nature. Two covered and monumental passageways, joining the buildings, enable him to start with the series at one extremity and follow it through to the other. All these

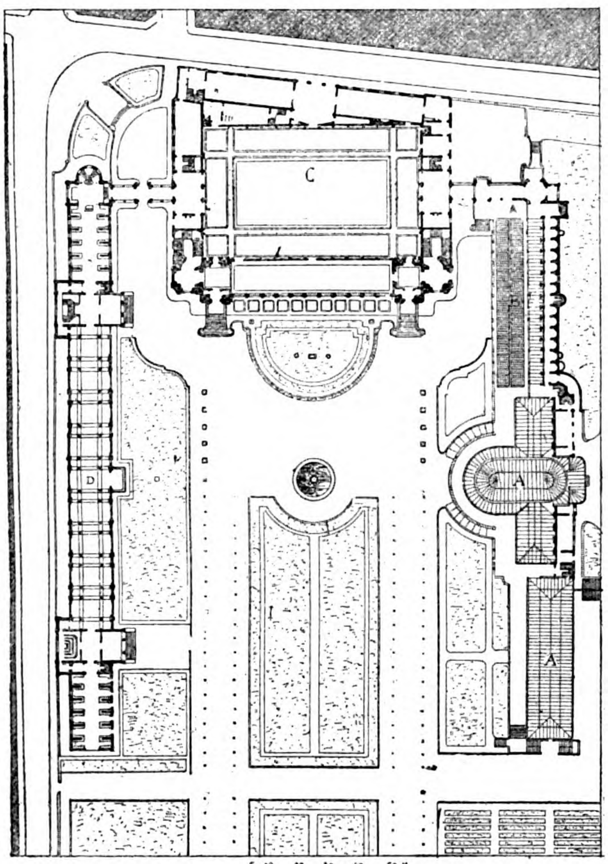


Fig. 2. Plan of the Museum of Natural History, Paris.

A. New Conservatories. *B.* Old Conservatories. *C.* New Building. *D.* Mineralogy.

galleries constitute a whole, although containing widely diverse collections. And as our art treasures are massed in the palace of the Louvre, so here and in other proportions the Museum presents the *ensemble* of our Natural History collections.

Before entering upon a description of the edifice, it has seemed best to call attention to the considerations that determined the choice of site and also to the general demands to be satisfied in a construction of this kind. It remains to be seen how successfully the programme has been filled.

The architect conceived the idea of a vast exhibition-hall with an area of 3,000 square metres, with light entering through the entire ceiling and the axis of the apartment on the passage connecting the old buildings. In front, and facing the parterre, three stories of galleries furnish space for special exhibits. On the sides, are the supplementary services: lecture-room, professors' offices, etc. In the rear, on the Rue Geoffroy-Saint-Hilaire and occupying the site of the former Cabinet of Natural History, the plan was to construct a series of galleries for the department of Comparative Anatomy; but his work has not been begun.

The main façade of the new zoölogical galleries is 100 metres long. This length is due to the character of the site itself; the architect insisted upon making the structure harmonize with the surroundings. The rows of trees mentioned above now lead up to the two entrances, and the latter are rendered still more prominent by two monumental pavilions. A central entrance, useless, as we have seen in an edifice of this kind, would, moreover, have had no *raison d'être* in the axis of the grand parterre, which does not constitute a public path. The conservatories on the right, on a slope, and the geological galleries on the left, the architecture of which is somewhat cold, bring the eye to the centre. The more important new structure supplies the central motive which had been lacking.

The lines of the façade are simple and majestic, as befits a temple of Science, and indicate clearly the three different stories of galleries. The grand order is reserved for the principal story, which contains the largest hall; it is supported on the the ground-floor by a row of broad pilasters, forming buttresses and giving color to the basement story. The fact must not be overlooked that this façade has a northern exposure, that it is not lighted by the sun and that, as the character of the edifice precluded the lavish use of ornamentation, the architect was obliged to adopt a simple decoration, introducing strong projections to avoid coldness and monotony and relying upon the massiveness of the construction to convey an adequate impression of the wealth accumulated in it.

Lastly, this façade indicates to the most casual observer the general composition of the vast establishment. On the right is the menagerie with its widely diverse constructions; on the left, the numerous laboratories. Midway, at the end of the parterres designed for the study of botany, are the exhibition galleries for the three kingdoms of nature. At the centre of the whole and uniting all is the Museum, the zoölogical building, containing the great hall in which the finest specimens are gathered together and which has become the heart of one of the largest scientific establishments in France.

The three tiers of galleries rest on a very spacious well-lighted underground story used for storage purposes. Here, too, are unpacked the rich collections that often come from long distances stowed away in many boxes. On the ground-floor, lighted by large semicircular bays, is a gallery 60 metres long by 10 metres broad, admitting of three rows of glass cases, in which are exhibited the monkeys, felines, etc.

[To be continued.]

THE MC'GREEVY-CONNOLLY TRIAL.— GOLD-MINING. — TRUTH ABOUT THE ATTEMPT TO BLOW UP THE NELSON MONUMENT. — A NEW DRILL-HALL — TORONTO'S WATER-SUPPLY.

THE celebrated McGreevy-Connolly case, postponed so many times, has at last come to trial. It may be remembered that the origin of the case arose during the summer of 1891 before a Parliamentary Commission of the Canadian Dominion House of Commons. Something like three millions of dollars, grants of public money, were involved in the case in connection with Government construction works at the Harbor of Quebec. At the same time it was found that the government works at the Esquimault graving-dock in British Columbia and certain other works involving immense outlays had given opportunities for the squandering of public moneys. The firm engaged on these works was known as Larkin, Connolly & Co., but it was shown that Major Larkin was in no way connected with the transaction in question and he was allowed to withdraw. Robert McGreevy was a partner in the firm and held that position solely because of his influential brother, Thomas McGreevy, a member of the Dominion Parliament and also a member of the Quebec Harbor Board and a personal friend of Sir Hector Langevin, then Minister of Public Works. This friendship between Langevin and McGreevy made the latter an important member of the Harbor Commission and he did not scruple to use his influence with the minister to obtain large sums of money on account of the government contracts which were spent not on the works for which they were drawn nor upon himself, but

upon his party for electioneering purposes. The result of the Parliamentary inquiry was primarily the disgrace of Sir Hector Langevin, who resigned his office, and the dismissal of Thomas McGreevy from the House of Commons. This suit is the final outcome wherein McGreevy and Connolly were charged by the Crown with conspiracy to take money out of the public treasury. The original case was recounted in these letters at the time. It charged that Thomas McGreevy was an agent for the firm was of Larkin, Connolly & Co., whereby he secured contracts and alterations in these contracts, while at the same time he was a member of Parliament. When the case was called on November 14 at Ottawa, before Mr. Justice Rose, a great array of legal talent was present on behalf of both prosecutors and prosecuted. It took nearly three-quarters of an hour before the jury was finally empanelled, owing to the number of men challenged by both Crown and defendants. B. B. Osler, Q. C., one of the council representing the Attorney-General of Ontario, who prosecuted together with the Dominion Government, laid the case before the Court. The charge was certainly a serious one. The McGreevys made a "good thing" out of their relationship, the one, with his hand on the government purse, and the other with his in the affairs of the great contractors Larkin, Connolly & Co. Robert McGreevy obtained thirty per cent as his share of the profits of the firm and divided it with his brother Thomas, M. P. While the firm paid to the latter separate commissions for securing to it the contracts for government work, in one case amounting to the handsome sum of twenty-five thousand dollars. As an example I may refer to what is known as the "Cross Wall" contract. "By a device of McGreevy, when tenders were opened the lower tenderers withdrew and the third highest tender, that of Larkin, Connolly & Co. was consequently accepted. The lowest tender was $552,000 and that of Larkin, Connolly & Co. $634,000, while the work actually cost the government $830,000." All this was done by private information provided through Thomas McGreevy, and it was for this that Robert McGreevy got 30 per cent and divided it with his brother. The case was concluded on November 22, when McGreevy and Connolly were both found guilty of conspiracy and sentenced to one year each in the County of Carlton jail without hard labor.

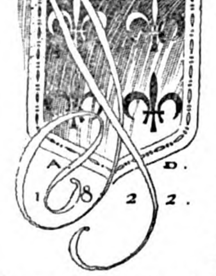
Some time ago a company was organized for the purpose of mining gold at Galbraith, District of Algoma, Ontario, at what is now known as the Ophir Mine. A vein was discovered here and is now worked at a depth of 150 feet and is said to be a true fissure between syentic rocks, and from 20 to 40 feet wide of gold-bearing quartz. A brick of solid gold was forwarded a few days ago from the mine to the Canadian Bank of Commerce, Toronto, weighing 220 ounces and valued at $4,000. The brick is of interest as it is one of four that were the result of the first week's crushing done at the mine works. The four bricks are said to be worth together at least $12,000. There is no mint in Canada, so that this gold has to be sent to the United States mint at Philadelphia for coinage.

It is not a little amusing to see how easily alarmed people become nowadays and what mountains they make out of mole-hills upon the slightest occasion. The importance attached by the press at a distance to the intended attempts to blow up the Nelson monument at Montreal by a triplet of young scamps was somewhat premature, and it would have been wiser to have obtained particulars of the affair in detail before attempting to ascribe it to revolutionary principles. Some damage no doubt would have resulted to the monument if the plot had not been discovered, and exactly what was the object of the miscreants, beyond mischief, has not yet been discovered. One of them was the son of Mercier, the ex-premier of the provincial government of Quebec, who was dismissed from his office for malpractice and found the English of Canada too strong for him, and his notion of reforming Quebec in the interests of France and of the Pope, whom he serves in the capacity of Papal Zouave, distasteful to the majority of Canadians, including many of the French-speaking people themselves. Young Mercier may have wished to take such a step by way of revenge for what his father suffered on account of his misdeeds, but it has not transpired whether Mercier, Junior, was the ring-leader or not. At present the three are in jail awaiting their trial. The monument in question stands at the head of Jacques Cartier Square, which slopes down from the base of the monument to the river. The monument consists of a column surmounted by a statue of Lord Nelson, and at the base are two Russian guns, trophies from Sebastopol, presented to the city by the Imperial Government. The column was erected in 1808 by the merchants of the city, many of whom had a personal recollection of the hero, who was on the Quebec station in command of the "*Albemarle*" in 1782.

The new drill-hall being erected by the Dominion Government in Toronto, is approaching its completion. It is, I believe, the largest hall for the purpose on the continent. Montreal has a fine drill-hall, completed about six years ago which is a little longer than this one, but this is wider, and contains in addition a large number of armories and other accessories which greatly exceed those of the Montreal hall. The Toronto drill-hall covers an area of 300 feet by 189 feet six inches, of which the space of 280 feet by 125 feet forms the main hall for drilling. The height of the interior of this hall is 36 feet to the wall-plates and the great roof of one span rises to its apex another 36 feet. Half of the area under the drill-hall has been excavated and fitted-up for bowling-alleys and for rifle-practice with the Morris tube. The cost will be in the neighborhood of two hundred and seventy-five thousand dollars, and when finished will be an excellent example of completeness and convenience as regards drill-halls, and it should stand an object of study to students. The construction is very massive, the design "military," and the details bold; but a building of this kind can never be actually beautiful, architectually, because immediately you get it in perspective the immense area of roof dwarfs its proportions and it becomes squat and ugly. Some relief has been obtained from this effect in this case by the erection of towers in the centre of the long sides which break the continuity of the roof slope, and on the whole the effect is very good.

There are few public buildings just now in course of construction, and in these inland cities we do not get the chance of seeing any great engineering works.

We have often alluded in these letters to the water-works system of the City of Toronto, and it will be remembered how this month last year witnessed the sudden ruin of the then recently completed steel conduit under the Toronto Bay (which, with the island, forms an enclosed harbor for shipping) by means of which lake-water was pumped to the city reservoir; something stopped up the inlet out in the lake and the pumps drew out all the water in the conduit, whereupon it rose to the surface and lay like a sea-serpent stuck in the ice. The conduit was repaired, but is considered as totally unreliable, and that which was to have given a permanent pure-water supply to the city and was laid at an immense cost, was, through mismanagement, a complete wreck in six months after its completion. It has now been decided to tunnel under the bay and across the island and away out into the lake; a very costly alternative and a work that will take two years at least to finish, supposing the work proceeds without the usual quarrels between the city and the contractors and the consequent interposition of injunctions and counter-injunctions, but until that is all done the citizens remain in imminent danger of a repetition of last year's pure-water famine and at any time we may be told that it is necessary to boil every drop of water for drinking. The great canal scheme, which was mentioned some time ago and which was for the purpose of supplying Toronto with an aqueduct from Lake Huron and a ship-canal, giving water-power sufficient for all the city's factories and everything else that man could possibly want, after being forced before the public by the most determined of promoters, has fallen through. Never before did promoter obtain so much indulgence or was allowed to pester the public with an impracticable scheme as was the man who developed the idea, but despite the contrary and adverse opinions of engineers, financiers, and a host of practical scientists, he still found a party in the City Council to prop up his plan, which on the face of it was simply to discard the beautiful water of the Lake Ontario and bring water from another lake a hundred miles away, because through fraud and mismanagement and general incapacity of those in charge, the works provided for supplying the city with pure water had hitherto failed. The company he declared himself as representing, but whose identity he would never disclose, has at last been proved to be non-existent. There was a time when some American capitalists thought of taking it up, but it was recently found that all had withdrawn from it, although the wily promoter carefully kept this secret as long as he could. Now there seems to be an end of bubble schemes and the citizens look forward to be able to get a *permanent* supply of pure water in *about* two years time.



THE UNION TRUST BUILDING.—THE IMPROVEMENT OF TWELFTH STREET.—THE NEW UNION PASSENGER-STATION.—PROPOSED STATUE OF "ST. LOUIS."—THE NEW CITY-HALL.—THE SMOKE NUISANCE.

THERE are many evidences in our country that the practical is fast giving way to the artistic in those lines in which the latter should have long ago asserted itself. We are a nation of tradesmen, and all our ideas have heretofore seemed to follow the one standard dictated by business, selling and buying. A new era seems to be setting in throughout this vast continent which bears the imprint of a rapidly-advancing civilization and the fortunate state of things for some of us that we have time to devote to things artistic. That this is bound to have its influence on the country's future existence cannot be gainsaid, because at any rate, this influence would come about in the natural course of civilization. Architecture being one of the fine arts, and appealing more to the people in general than either painting or sculpture, that is to their artistic appreciation—if there be such in the souls of some of them—is and will be the most influential guide of the nation's refinement and culture or of its artistic taste. We have hinted at the starting of an era in architecture which partakes of the artistic. Chicago people and others would like us to say that this is the result of the magnificent effort and genius displayed in

the Columbian Exposition buildings. Several years before 1893, however, saw the beginning of this happy era, and the present time sees it flourishing.

Most of us will acknowledge that the greater number of the utilitarian sky-scrapers in Chicago do not excel in architectural beauty, and when it was announced that the Union Trust Building was to be the finest office structure in St. Louis, we naturally looked forward to a feast of architectural good taste. But we are very much disappointed. Truly enough the Union Trust Building will yield a large revenue, but to the architect of refined tastes and classical ideas, the fourteen-story structure means nothing from an artistic point-of-view. The design is doubtless well known, having been exhibited by the architects in the Art Building at the World's Fair. The building fronts on Olive Street, the square court facing south in the direction of the thoroughfare mentioned, and runs along Seventh Street to the alley, half-way to Locust Street. The first two stories are built of yellow terra-cotta, and the remainder of the building to the thirteenth floor with yellow pressed-brick. The thirteenth and fourteenth floors are slightly recessed, and the windows divided by terra-cotta on a level with them and isolated pillars to support the roof and cornice. It is the intention to provide a roof-garden. The entrance on Olive Street is of the well-known "golden-gate" type in yellow terra-cotta, with an egg-and-dart moulding so large in proportion that it is a wonder that the ancients do not rise out of their graves, and protest against it. The vestibule, passageways and corridors are laid in mosaic and wainscoted in brown Tennessee marble. The five elevators are encased in ornamental oxidized brass-work.

In strong contrasts, with this from an artistic point-of-view, is the laudable idea which the city government is at present entertaining regarding the improvement of Twelfth Street. This is virtually an open square, extending five blocks from St. Charles Street to Market Street, and for this distance it is 200 feet wide. The city proposes, at the instigation of the property-owners, to widen the thoroughfare from St. Charles Street to Washington Avenue, and from Market Street to Spruce Street, to 200 feet, thus making the width uniform for eight squares. Also to construct a walk in the centre of the thoroughfare 35 feet wide, and at suitable intervals in the centre of the same to erect very high ornamental steel poles for electric-lighting purposes. As a new viaduct is to be built at Twelfth Street beginning at Spruce Street, where the wide portion of the former terminates, it is proposed to build a triumphal arch at its entrance. The new city-hall is located on Twelfth Street rather far back from the building-line. This fact alone shows that the city has long cherished the apparently new scheme. It is proposed to build the new court-house on the street, occupying the half-square from Chestnut Street to Market Street. A large market-house has been considered as quite appropriate and feasible for such an importan**t** retail thoroughfare as it is fast becoming. Three substantial structures have lately been erected, two of them seven and the third eight stories in height. They are retail in character, and will doubtless be quickly followed by a large number of handsome structures as soon as the city decides in favor of the project, which will, unquestionably, be the case. The part of the proposed improvements devolving upon the city will cost several millions of dollars, to which the property-owners have willingly signified their intention to submit in the shape of the assessments as at present estimated.

Among the most prominent structures being reared in St. Louis at the present writing is the new Union Passenger Station. The train-shed, station-building, terminals, etc., have attracted the attention of architects and engineers throughout the world for some time past, on account of their great size, costliness and beauty. The station is, without doubt, the largest in the world, as the appended figures in square feet will show: St. Louis Union Station, 420,700 square feet in extent; Frankfort (Germany), 336,340 square feet; Cologne (Germany), 238,970 square feet; Philadelphia and Reading, at Philadelphia, 208,000 square feet. The site is 601 feet in width, extending from Eighteenth Street to Twentieth Street and 700 feet long, extending from Market Street to Clark Avenue. The entire site is occupied by the train-shed and station-building. The former, although under one and the same roof, is divided into three parts by the roof supports, it having been found impossible to do without these on account of the great width to be spanned. There are thirty-two lines of rails, a larger number than in any other railway-station, even exceeding that of the Gare St. Lazare, in Paris. The station-building is very substantial and appropriate. It is French Renaissance in style with many modifications to suit the case, and is built of rough-cut Bedford stone. A very handsome Norman clock-tower, 287 feet high, is to be built at the Eighteenth and Market Streets corner. The structure is entirely fireproof, and the appointments and furnishings will be the handsomest that money can buy. The cost of the entire undertaking will be over $2,000,000, exclusive of the cost of the site, and it is the intention to open the station in April or May, 1894.

The main entrances to the station are on Market Street, a very narrow and much crowded thoroughfare. In view of this fact, the City Government proposes to buy the two squares of property opposite and convert them into an open square. Otherwise the congested condition of Market and surrounding streets would be unbearable. The new square will be graced with the statue of some noted personage, such as Queen Isabella, in commemoration of the great events of the last two years and 1492, or St. Louis, King of France, after whom the city was named. The republic of France, by the way, has several times hinted that she would like to present us with a statue of St. Louis, and the people have never

A Sketch in the Court of Honor of the World's Fair.

signified a desire for such a gift. That we would readily accept it, goes without saying, and it seems to us that the present is an excellent opportunity to make this known to the French Government through their consul at St. Louis.

The architects of the new city-hall, now in course of erection, are to be more and more congratulated on the entire success of their efforts, as this handsome structure approaches completion. The design is well-known, we presume, but for the sake of those who are not acquainted with it we will describe it as French Renaissance. That this style is eminently adapted to the purpose is established by the entire success attending its application in the Hôtel de Ville, at Paris. In fact, the St. Louis City-hall though not as handsome as the Hôtel de Ville, is imbued with the same feeling and partakes of the same plan and scheme as the French structure. Unfortunately, the city did not feel able to stand the expense of employing only cut-stone, and the result is that yellow Pompeiian brick with Bedford-stone trimmings is used. The effect is rather pleasing, as the dull gray stone matches very well with the brick. It was maintained by many members of the Board of Public Improvements that only materials found in the State should be used in the building, but the architect protested that to carry out his ideas he would have to use gray sandstone, and that the Bedford (Ind.) deposits of that kind were the best and most convenient. Some Missouri red granite is used, and the rough finish given to it imparts an air of strength and stability, which is not followed out in the rest of the building. In fact, if the whole building were of the latter material it would not cost much more than at present and would defy the ravages of time. We have not much faith in Bedford or any other sandstone, as our observations have caused us to believe that it will not stand the rigors of our climate. In ornamental work especially it disintegrates very rapidly. The architect of the city-hall has a weakness for niches, two of which he has placed on the main façade of the building over the chief entrances. We say he has a weakness for such, for he has placed several on another building recently put up by him. In the case of the City-hall, many people have wondered whose statues were to be placed in the niches, and brilliant wits have suggested our virtuous mayor and incorruptible president of the City Council. The tower will be exactly similar to that of the Hôtel de Ville, and its pinnacle will be the highest point in St. Louis.

As is well-known, the building is located on what was once Washington Square, and needless to say it does not occupy all the site. This fact demonstrates that there are great possibilities in connection with beautifying the surrounding grounds and laying them out with walks, trees, and flowers. It is rather fortunate that the building is not hemmed-in by four noisy granite-paved thoroughfares. The noise in the old hall and the present Court-house is something fearful, especially during the warm months. The streets surrounding the latter building have lately been paved with Nicholson wooden blocks, which greatly alleviates the suffering of judges and witnesses. However, the clanging gongs of the cable and electric cars still "disturb the peace."

One of the most disagreeable and unfortunate features that exists in cities west of Pittsburgh is the necessity for using bituminous coal. To be sure, Pennsylvania anthracite coal must be used in a great many cases, such as in furnaces for heating houses. But St. Louis, Cincinnati, Chicago and other western cities more or less prominent, are almost entirely dependent on bituminous coal. The results of its use are well-known, and naturally the abatement of the smoke nuisance has become the question of the hour in those cities. The smoke and soot are so troublesome in St. Louis that where in many cases cream-colored brick and other light materials could and would be used in the construction of handsome buildings, they have to be abandoned. Yellow brick is used to some extent but its use is not general in the down-town districts. Marble and white limestones and sandstones are used in the far-out residence-sections because they are beyond the smoke line. The district within the latter covers an area of about forty out of the sixty-two and one-half square miles constituting the city proper. Any one who has ever been to St. Louis has undoubtedly noticed, twenty-five or thirty miles distant from it, the huge overhanging pall of black smoke. That the smoke nuisance is very hurtful to St. Louis as well as other cities cannot be denied, and one of the greatest eye-sores to Continental Europeans visiting the World's Fair was the smoky, and, consequently dirty condition of Chicago. Such a state of affairs hurts the business interests of a place, prevents the preservation of works of art, besmears one's countenance and linen, and covers the finest buildings with a grimy deposit which rains and winds will not erase.

Judging from present events the city of St. Louis has taken vigorous action in the matter and will make of the Mound City "the fairest of the flock." A law was passed about one year ago by the Municipal Assembly compelling all manufactories of whatsoever kind using steam-power, including stations for lighting and power purposes and heating-plants, to equip their furnaces with smoke-consumers. Little or no attention was paid to the law at first, and in fact it met with opposition, but when private individuals took the law in their own hands and reported its trangressors, the latter began to appreciate its importance. However, nothing could be done in this wise, because not a single smoke-consumer worthy of the name had yet been invented. The city knew this and did not appoint salaried smoke-inspectors until later on. A number of enterprising and conscientious business-firms have tried several devices, and by experimenting have succeeded in producing an excellent device which is a smoke-abater in the full sense of the word. It can be applied in any steam-plant by simply leading steam through a pipe from the dome of the boiler to the furnace. A nozzle on the end of the pipe shoots the steam all through the smoke as it rises from the fire, and as the particles of steam drop they carry the soot with them. The latter is consequently consumed by the fire. An improvement on this device consists in the steam forcing the soot into a far corner of the furnace where it is dropped in the manner aforementioned and consumed by the flames. Experiments made with the improved consumer demonstrated that when in use the smoke is absolutely prevented from going out of the stack, and the latter is of no use, whatever, except for affording draught to the furnaces.

The city appointed smoke-inspectors several months ago, who are paid a fixed salary. They note troublesome chimneys in their respective districts and report them, at the same time warning the owners that they are transgressing the law which requires them to put in a smoke-consumer within thirty days after notice has been given. Failure to comply with the law entails a fine of five hundred dollars and costs. Many consumers are now in use, and the good effects of the law are already most apparent.

HOSPITAL CONSTRUCTION.[1]

IN return for the honor done me in being asked to read a paper on "Hospital Construction" before this intellectual gathering, I shall try to give in as concise a form as possible, first, my own ideas as to the constitution of a first-class Australian hospital, and secondly, a modification of the same where sufficient funds are not available to build a first-class institution. I will, with your permission, glance for a few moments at the history of hospital constitution. I believe it to be correct to say that there was an institution in Ireland 300 years B. C., founded by the Princess Macha for nursing the sick and those wounded in battle. In the same century the great Guzerat king, Asoka, built several hospitals in India. Later on, at Cæsarea, was built a great hospital and leper-house. Alexandria had its hospital. Rome had a hospital in 380 A. D., founded by Fabiola, a pious Roman lady. The Emperor Justinian built the hospital of St. John at Jerusalem. This hospital afterwards came under the control of the Knights Hospitallers, afterwards the Knights of Malta; the original Order is now represented, I think, by the Christian Masonic Order of Knights Templars. The ancient Mexicans had hospitals and skilled surgeons. Again, in Spain there was the hospital founded by the Moors in Cordova, in the eighth or ninth century. In Paris the Hôtel Dieu, known as the Hospital of St. Christopher, was founded later on. In England St. Thomas's and St. Bartholomew's were established in the sixteenth century, though the monasteries from early periods acted as outdoor dispensaries, and in very many instances had special rooms or wards set apart for the treatment of the sick; in fact, the practice of the art of healing and surgery was principally in the hands of the monks in England and the Christian countries, and of the Jews in Spain. The eighteenth century saw the establishment of the present system of hospitals in England under the direction of laymen, York, in 1710, being the first of a number which shortly followed.

I will now briefly sketch my conception of the requirements of a first-class Australian hospital. First, and of the utmost importance, a good breezy site, if possible on a limestone plateau, with open surroundings and in a salubrious district. Second, carefully-studied construction based on hygiene. Many have supposed that architectural considerations should be allowed to predominate in the construction, but the true basis of hospital construction should combine the science of hygiene with the results of the experience of the best surgeons and medical practitioners; in short, such construction as will advantage the life and health of man rather than satisfy æsthetic tastes; and while the constructor should not be unmindful of the latter he must absolutely pay primarily the strictest attention to the proven results of medical experience, using his knowledge of construction to achieve the requirements demanded by the most advanced healing sciences; and always aiming to, so far as possible, deprive the causes which vitiate the air of a hospital of the power to create mischief. Only by striving to guarantee the maximum attainable purity of the essentials to good health and life can he hope to gain success as a constructor. Were money no object, and were I consulted as to the best method of designing a hospital, I would recommend a series of small one-story, isolated pavilion-wards, grouped round a large central administrative block, and equidistant from a main operating-theatre, with special wards attached. Each isolated pavilion-ward to contain, say, from twelve to sixteen beds, with two small single-bed separation-wards, small ward operating-room, nurses'-room, ward store-room, convalescents' day-room, bath-rooms and hot and cold water, separated patients' water-closets, with fæcal trough and fæcal cupboard, nurses' water-closets, and the whole surrounded with broad verandas, connected directly on each side with ward, so that patients' beds could be wheeled right out into the fresh air. The administrative block should have in near proximity the kitchens, laundry, servants' house with housekeeper in

[1] A paper read before the Australasian Association for the Advancement of Science, at the meeting held in Adelaide, by Mr. C. E. Owen-Smith, superintendent of public buildings, Adelaide, and published in the *Australasian Builder.*

charge, nurses' house with superintendent in charge, and in rear the mortuary-house, dissecting-house and steam disinfecting-house. Wards to be grouped separately for medical and surgical cases — contagious diseases or noisy cases or delirium-tremens house to be set well apart; while for epidemics, in the extreme rear could be temporary buildings for use when required. Each isolated ward to have a broad zone of aëration, and to be connected by tram-line with the central operating-theatre and the main administrative block. The small tram-lines would carry the patients in an enclosed litter to the operating-theatre, and food, coals and materials generally for distribution around the wards. All walls should be of brick and hollow, allowing free ventilation from ground-line to underside of roof between walls, the sun-heated air being carried off thence by dormers. Walls at least, including hollow, 20½ inches thick. Internally all walls of wards and theatre to be sheathed in glazed tiles. Ceilings of panelled wood, painted and highly varnished, and covered on top with a heavy coating of sea-weed. Floors of Minton tiles covered, in winter, with pieces of soft felting, frequently changed and disinfected. Ventilation, etc., as will be hereafter described. Such wards as described with proper inlet and exhaust natural ventilation. 2,000 cubic feet of air per bed; 16 superficial feet of light per bed; perfect sanitary appliances; good nursing and the professional care of a hospital staff should be almost perfect. The operating-theatre block should contain waiting-room and instrument-fitter's shop combined; anæsthetic-room leading into theatre, and a corresponding room on the other side for surgeons; and, connected by corridor with theatre, two four-to-six-bed wards and two single-bed wards, with nurses'-room between. In the operating-theatre I consider it absolutely essential to have a zone of warm air surrounding the table in winter-time; this can be provided with the aid of a gas-heated coil. I strongly recommend the cleverly-designed table used in our theatre which can be inspected by visiting surgeons; the designer is Mr. Woods, the hospital instrument-fitter. The kitchen-block should contain large kitchen proper, with roasters, cupboards, tables, etc.; steam-cooking kitchen, scullery and main boiler-house, from which all the steam required in the institution can be supplied, viz, cooking-steam, steam for hot-water generators for distribution by gravitation from special tower in administrative block to all wards and buildings, steam for washing-machines in laundry and for drying-room, also for the super-heated steam-disinfecting machine. And here I may say I know of nothing better for hospitals than the Washington Lyon machine; the super-heated steam-process of disinfecting has by results rendered the use of the dry hot-air process absolutely out of date. To go back for a moment to the kitchen, large well-ventilated cellarage is an absolute necessity, the whole, including ventilation-shafts, rendered fly-proof. The kitchen should also, by use of wire-doors, wire window-screens and ventilation-openings, be fly-proof. By using jacketted copper-boilers and ordinary direct-steam copper-boilers, the cooking of potatoes, vegetables, boiled meats, soups, etc., for large numbers is rendered comparatively easy. Colonial-made ranges can do the rest in roasting, baking puddings, etc. Kitchens should have iron and Seyssel-asphalt floors with central drainage for frequent hosing. Walls can be unplastered, with struck flush-joints for whitewashing, which should be done periodically. Laundry-block should have walls and floors as for kitchen, and contain steeping and disinfecting tank and steam-boiling troughs and automatic washing-machines, drying-room for bad weather worked by steam-pipes, or, if too great a strain on the supply of steam by furnace, with circulating smoke-flue. Mangling and ironing room should be attached. Separate troughs should be provided for the clothes of staff, nurses, servants, etc. The mortuary-house should contain a large post-mortem room, with smooth Seyssel-asphalt floor, plentiful supply of hot and cold water, extra light and semi-open roofs, carefully-graded drainage of floor, with cemented or tiled walls; also inspection-room, where bodies are coffined and await the undertaker. The whole of the mortuary should be absolutely fly-proof and allow a free circulation of air. I should not forget to add that a special fire-service is an absolute essential in designing a large hospital as also a swimming-bath, tennis-courts, dancing-room, etc.

As "the money no object" basis of the ideal hospital just described is not compatible at present in Australia with bank reconstruction and curtailed estimates, I shall proceed to describe what I trust may be termed a good serviceable hospital, taking, in terms of the request made by the committee of Section I, the southern portion of the east wing of the new Adelaide Pavilion Hospital as an exemplification of a portion of this class of institution. The Adelaide Hospital, being a clinical institution, must of necessity be in close proximity to the School of Medicine in the city; consequently the area of site is limited, in fact too much so, and while a good zone of aeration is obtainable in the north, east and west, and to a certain extent on the south, within the area available for the future hospital, the space is too limited for such results as a conscientious constructor would desire to attain. A little extra money expended to insure dependable foundations in a hospital, as in other buildings, is always true economy. Should the ground be bad or unequal, a false bottom or cushion of fine sugar-sand from 12 inches to 18 inches deep, according to circumstances, has proved itself a perfect cure, and by the introduction of two rows of railway irons into the centre of the concrete a further bond of security is established. Either clinker-bricks or hard, flat stone of extra-large size can be used for foundation-walls between concrete and floor-line, and to prevent the possibility of damp rising, two courses of damp-proofing are desirable, either ordinary gas-tar and sand or Seyssel asphalt being used where obtainable of good quality. I prefer bricks for construction of superstructure. Brickwork is cheaper than stone, and makes sounder work. Hollow walls are very desirable in this hot continent, but they have their disadvantages in two or three storied buildings as lacking in stability, though this can be overcome by increasing the thickness and consequently the cost. The operating-theatre block has hollow walls, being a single-storied building. As mentioned before, a Minton-tiled floor is suggested as being the best from a hygienic point-of-view; this, however, means money, and the next best floor is hardwood. Personally, I prefer jarrah to any other wood, but again cost interferes, as to insure a sound, close-jointed floor, the timber ought to be specially selected, milled and seasoned for at least three years before use; and even then probably 25 per cent of the boards may have to be rejected before securing a first-class floor. But when a good jarrah floor is obtained but little is left to be desired. The proper treatment for such a floor, after being cleaned up and papered, is a thorough saturation with raw linseed oil, then varnish, and finally hot beeswax and turpentine, rubbed up to a smooth, shining surface. After jarrah, our choice of available timber is limited to pitch-pine or New Zealand kauri; either gives a splendid floor but care must be exercised with each. The former should be high-colored and have two or three years' seasoning; the latter should be light-colored in contradistinction to red, and used bone-dry, care being taken to exclude all damp air from the underside for a season. Both floors should be waxed. A room 100 feet long by 26 feet and 18 feet high, giving nearly 18,000 cubic feet of air each to twenty-six beds, is an economic ward. The corners should be rounded to do away with internal angles, and so prevent dead air. As little woodwork as possible should be used, a coarse Keene's cement for architraves, window lining and skirting being preferable to wood, and as little moulding as possible. When ready the walls should have five coats of paints and two coats of the very best elastic varnish. The ceiling can be of plaster, wood, or 28-gauge small fluted, corrugated, galvanized-iron; the latter makes a splendid ceiling and leaves little to be desired, and is considered an improvement on lath and plaster, not being subject to crack or fall down. In any case, whether plaster, wood or iron be used, the ceiling must be painted and varnished, and in the case of a two-storied building, sound deadening must be filled-in above the ceiling and under the floor of the ward above. A central fireplace is considered an improvement on the old system of fireplaces in the walls, and the main shaft can be used for decorative purposes to brighten the ward. In Australia, natural ventilation has, I believe, been found to answer all purposes in hospital construction when judiciously applied. Fresh air should be introduced through the external walls delivering under each bed, and again at, say, 7 feet 6 inches or 8 feet above floor-level, with a special terminal to prevent the cold air falling directly onto the patient below; while by a system of extracting pipes from ceiling and pipes carried up in centre of chimney-shafts, aided by the fires in winter and the difference of temperature between internal and external atmosphere in summer, helped again by the wind acting on the specially constructed terminal cowls on roof, the experience of several years has proved that hospital smells can be conquered, more especially if the attendants will judiciously use the fanlights placed over each window as an additional aid at night and the windows themselves in the daytime. Free currents of air should also pass from end to end of the whole block and from side to side. Wards should have large arched openings with screens within, uncovered, thus allowing free passage of air without direct draught. Each large ward should be provided with a dirty-linen shoot, delivering from ward to outer air direct and thence into laundry truck *en route* to steeping and disinfecting trough. In connection with such a ward as described should be a day-room for convalescents — the day-room combining the useful with the helpful, as it allows patients, sufficiently recovered to leave their beds, to sit there and have their meals; it also helps the wards by removing so many patients out for a certain time each day, giving more air to those remaining. In conjunction with the day-room should be separated water-closets, specially designed so as to be cut off by a fresh-air space from the building proper; the lavatory and baths, with hot and cold water, store-room and ward-scullery, all connected with deep drainage and almost perfect sanitary appliances. I may say our South Australian system is as nearly perfect as obtained in any part of the world at present, as inspection will illustrate better than words. A well-flushed glazed fæcal trough, and a cupboard for excreta requiring inspection by medical officers should be contained in the closet arrangements. Access direct, either from wards or day-rooms, should obtain from ambulatory verandas and balconies, etc.; these should be on all sides, to allow patients to have the benefit of sun or shade, according to the season of the year or time of day. On the opposite end of a large ward to day-room, etc., should be the room of the sister in charge or head-nurse, with glass door giving full view over ward, also a small ward operating and casualty room, store-room and a separation-ward of three beds for special cases. This room should have double doors and be equally as well ventilated as main ward. Repeat the ground-floor plan on first floor, with the balconies, etc., and the accommodation is at once doubled. External fire-escape stairs should be provided from balcony. In our hospital we have provided an Otis hydraulic-lift for

patients and to send up dinners, etc., to first floor. A staircase travels round the elevator-case for ordinary traffic; a special water-service is provided for use of the lift. As space is limited with us, a second floor or third story has been built on central portion of wing for the ward-nurses, etc., accommodation for sixteen being provided, the floor being 39 feet above the ground. Nurses have bath-rooms with hot and cold water and water-closets, etc., on their flat, also connection with a large platform on roof overlooking city for taking the air on fine nights. Ward furniture requires a few words. Bedsteads should be very strong, with woven-wire mattresses, carrying the horsehair mattress. The latter need not be more than twenty-five pounds weight. These bed-steads are made in the colony. Each bed should have bracket on wall at head for medicines, name of patient, and his ailment, etc. A small table on solid pedestal is provided for each bed. Electric-lighting is the proper thing for hospitals, as the gas consumes so much oxygen. Electric call-bells. One word and I close. No constructor should ever forget the claims of the nurses to generous treatment in the shape of comfortable accommodation.

GEOMETRICAL AND FLOWING TRACERY.

THE different varieties of tracery, both the great classes and their more minute subdivision, seem to have been so many unconscious principles of formation, distinct and independent from each other, at work in the minds of the ancient architects; so that while they are perfectly distinguishable in idea, they are altogether mingled together in the existing instances. Every conceivable stage of transition from earlier to later forms, and more than this, every conceivable mode of combining — often confusing — contemporary ones, is to be found among the countless shapes afforded by our ancient windows. In fact, a window constructed consistently on one principle is actually less frequently met with than one which combines two or three. It is the manner in which these combinations are effected which for the most part decides the degrees of merit in the composition of tracery. Sometimes two principles of formation, though perfectly distinct, are still in harmony with each other, so that their commingling may combine the beauties of both, and consequently originate forms of greater elegance than either can possess in a pure state. In other cases they are actually repugnant to one another, and the separate beauty of each is lost by the incongruous combination; and in others again, even when there is no such inconsistency in the forms themselves, want of skilful arrangement on the part of the designer may effect mere physical juxtaposition of what seem to be detached fragments of separate windows instead of a gentle fusing together into an harmonious whole. Sometimes two windows occur which must, in a formal arrangement, be set down under one class, while their real spirit and character belong to another.

I. *Geometrical tracery* in its widest sense may be defined as that in which the figures in the head above the lights have no connection with the lights below, but are simply put in independently to fill up the vacant space. It is usually composed of geometrical figures, the circle especially, both in its actual form and as an element in foliation; the cusps in the most pure and appropriate form of foliation are distinct arcs of circles, forming an additional order of tracery, which, if omitted, renders the design plain but not incomplete. Geometrical tracery contains two principal subdivisions.

1. *Pure geometrical*, in which the whole tracery is composed of actual geometrical figures, chiefly in England circles, but also spherical triangles and spherical squares. The east end of Lincoln Cathedral is the finest example of this style.

2. *Foil tracery*, in which the tracery is composed not of figures plain or foliated, but where the foils are themselves the figures — that is, trefoils, quartrefoils, etc., are inserted without any containing figure. This style is not found in any very large windows; it occurs comparatively rarely in small ones, but is a very important element in combination. Pure geometrical tracery requires two lights to support a figure; thus a two-light window has one figure in the head, a three-light two. Windows above three lights are usually formed by subordination of design; thus the eight-light east window at Lincoln consists of two large divisions, each of which is again subdivided; the rule just given of course applies to the subdivisions. This rule is commonly observed in England; not so abroad, to the great prejudice of foreign windows. In foil tracery a figure may rest on one light only. Contemporary with geometrical tracery, and indeed with Flowing and Perpendicular, is "arch tracery," in which the tracery is formed by mere arched lines; this assumes the mouldings of and enters into combination with all styles, but seems to have an especial affinity with Geometrical. It does not enter into its definition, and its lines are actually continuous, but its hard curved lines give it an analogy with that style, and its combinations with it are very numerous. Its two-light examples have merely the figure of the Greek Υ; those of greater size form two classes, viz: — (*a*) *Pure Arch Tracery*, where the lights rise to the architrave, increasing in height toward the centre. (*b*) *Intersecting Tracery* where the lights cross in the head. From the union and combination of these forms result the varieties of Early Decorated tracery; for instance, a pure geometrical skeleton will have the large circle in the head filled-in with a composition of foils, or an intersecting window will be interrupted by the insertion of a circle. But to enumerate every kind of combination would be almost to enumerate every Geometrical window. There is one remarkable form in which a skeleton of arch tracery is more or less completely filled-in with distinct foils; the east window at Trumpington is a fine example. From arch tracery also is derived the practice of subarcuation, or marking off one or more lights on each side to form a distinct composition by an arch stretching into the architrave. This will be found at all periods.

II. *Flowing Tracery* seems to have little more than an ideal existence, so comparatively few specimens remain which can be considered as being worked completely free from geometrical ideas, and yet have manifestly no signs of the approaching Flamboyant and Perpendicular. Flowing tracery differs at once from geometrical, as having its figures not inserted above the lights, but growing out of them; in arch tracery the lines forming the arched heads of the lights are simply prolonged in their previous direction; here they branch out freely and form patterns of almost endless diversity. To draw a line between even ideal Flowing and Flamboyant tracery is more difficult, and in practice most Flowing windows are more or less affected by the Flamboyant influence. But compared with the best Flamboyant as distinguished from the many unsightly vagaries perpetrated under that name, we shall find that the flowing Decorated piercings retain more of the character of individual figures allowing room for occasional unoccupied spaces, and are not of the same long narrow shape, but somewhat more squat, and having a foliation affecting the whole piercing, and not merely one end. This latter form is an idea essentially Flamboyant, though continually obtruding itself through the whole duration of Flowing tracery. In short, the Flamboyant is simply the continuation of the mullions in a particular form, leaving spaces between the lines; the Flowing, the fusing the mullions and the figures in the head together. Its outline is rather pyramidal than directly vertical. The transition from Geometrical to Flowing tracery is exceedingly curious; both actually intermediate forms and combinations occur. With regard to the former, we shall find a figure which may be called the ogee vesica occupying an analogous position in the Flowing style to that which the circle holds in Geometrical; and as the two figures have a great connection, the ogee vesica being the figure which would result from an attempt to fuse together several circles placed in juxtaposition, we shall find every stage of this process, both in the general design of large windows and in their smaller portion. Subarcuation is retained throughout the style, and all through the Perpendicular also. And the circle in the head of a large window exercises a very great influence; the figure itself in its purity maintained its position for a very long time, and the attempts to fuse it into the other lines are very numerous and remarkable, as at St. Mary Magdalene in Oxford and Hawkhurst, Kent. And when the actual circle or other figure has disappeared, traces may be found in the tracery of the centre-piece, which is continually found adapted to such a containing figure and often retains strong vestiges of the wheel in lines diverging from a common centre. Combinations are either when one part of a window is Geometrical, another Flowing, or when a skeleton of one form is filled up with details of the other; a skeleton of arch tracery filled-up with Flowing patterns in a manner just analogous to the formation of arch and foil tracery, is neither uncommon nor ungraceful. Flowing tracery seems divisible into the following classes, the first three of which seem to have their origin in the tracery of the wheel mentioned just above.

1. *Divergent Tracery.* — In this a point is assumed as a centre, and branches are thrown off from it; it hardly exists in a pure form in windows of more than two lights, where three piercings commonly diverge from the top of the central mullion, one to the top, two to each side, which is necessarily continued in a perpendicular line for some distance, which is, of course, prolonged when more than two pair of piercings are thrown off and the wheel motion proportionably lost. This is a most elegant form and more vegetable than any other; it is very important in combination with others, but is not adapted to large windows, though the western one of York Minster is constructed on its general principle.

2. *Convergent Tracery.* — This is the converse of the latter; the side piercings seem not to be thrown off from the centre, but to converge to it from the sides; like divergent, its pure form is confined to small windows but it is important in combination.

3. *Reversed Tracery*, in which the piercings seem to hang down from the top towards the centre. This is hardly found but in combination, and is often intermingled with the latter. These three, though having a Geometrical origin, exhibit a Flamboyant tendency in their foliation earlier and to a greater extent than any other forms of Flowing tracery. It is manifest that the direction which any piercings appears to take is very much affected by foliation at one end, and this form gives a great opportunity for long narrow openings.

4. *Reticulated Tracery*, in which the tracery is wholly composed of ogee vesicas. It thus answers to the pure geometrical composed of circles, both from the analogous position occupied by the figures in the two systems and the connection between the figures themselves manifested in many examples of actual transition between the two forms. This class, though by no means the most elegant, is at once the most common and the most typical form of Flowing tracery. It is, however, decidedly monotonous when spread over a large window. It is further open to the objection made with much less weight against Perpendicular, that it is not self-contained, but merely cut at an arbitrary point out of an infinite series of panels. In

many instances this fault is certainly remedied, but only by forsaking the principle of formation. This form also occurs to a great extent in combination: very pretty three-light windows are formed by a mixture of this and the divergent in the tracery, and a still better form by a reticulated skeleton, each of whose vesicas is filled with a divergent pattern. The figures are commonly quatrefoiled; when trefoiled at the upper end, as in Jersey, a Flamboyant tinge is introduced. They occur of many proportions, and by straightening the sides glide gradually and imperceptibly into Perpendicular.

5. *Ogee Tracery.* — This is in flowing tracery analogous to the arch form, being in fact arch tracery, employing for the simple arch the ogee as being more adapted to the flowing line. It admits of two varieties corresponding to those of the analogous form: — (*a*) Where the ogee arches intersect and the apex of one coincides with that of the window arch. This variety is very rare and very unsightly. (*b*) Where the ogee arches are left imperfect and no apex coincides with that of the window, so as to leave in three-light windows (the most common form) a large vesica in the head and large spandrels. This form is also much used in combination. The splendid windows at Heckington, Sleaford and Newark have chiefly skeletons of this form, with fillings-up of various kinds. By flattening the sides of the vesica in the head it sinks into Perpendicular even more easily than any other; the chancel of Kislingbury Church, near Northampton, is a fine example of this transition in an advanced stage. These classes in their different combinations will be found to exhaust nearly all the forms of Decorated windows with the exception of a few vagaries of all dates scattered up and down, which neither agree among themselves nor can be reduced to any class. — *The Architect.*

HAUNTED PALACES.

THERE is such a distinctly holiday flavor about the following collection of legends published a short time ago in the New York *Tribune*, that it seems quite proper to republish them at this time:

It is difficult to realize that here, at the close of the nineteenth century, there should still be educated people who believe in the existence of ghosts. One might have thought that the scepticism which constitutes so characteristic a feature of the present age, as well as the growing taste for psychical research and materialism, would be sufficient to counteract any such superstitions of mediæval times. But such is not the case. The belief in the supernatural seems not to diminish in Europe, but to increase with the growth of logic, science and enlightenment, and it is noteworthy that it is not among the relatively ignorant masses of the people that superstition is most strongly developed, but among those who have received instruction of the highest order and who, either by popular will or what is euphoniously described as "Divine Right," have been set up to direct, guide and govern their fellow-creatures.

It has frequently occurred to me that the belief in the supernatural might be assumed by these great ones of the earth for the purpose of endowing themselves and their surroundings with a respectability otherwise lacking. There is something so eminently respectable in owning a haunted house or palace. It partakes of the nature of ancestry and blue blood, in that it cannot be acquired by purchase, but must be inherited, evidence of this peculiarity being furnished by the significant fact that none of the English purchasers of the castles and country-seats of the old country families of Ireland has ever to my knowledge been honored with any visitation by the family banshee of the original proprietor. But the scepticism which this circumstance created in my mind with regard to the existence of spooks has once more been disturbed by the apparently authentic evidence afforded during the last few months of the presence of spectres in the royal English palace of Hampton Court and at the Royal Palace of Stockholm.

That Hampton Court Palace is supposed to be haunted is nothing new. It has long enjoyed that reputation. Indeed, the Corporation of the City of London is on record as having ordered 12,000 masses to be said for the repose of the soul of Queen Jane Seymour, one of the many wives of King Henry VIII, with the object of "laying" her ghost, which, even in the reign of King James II, was wont, according to popular belief, to wander about the corridor near the room where Queen Anne Boleyn caught her sitting on the King's knee. Unfortunately these masses do not seem to have been efficacious; for Queen Jane's spectre continues, so we are assured, to haunt the palace to this day. Fifteen years ago the inhabitants of the palace were alarmed by the sound of the whirring of a spinning-wheel at night, and, in deference to their urgent entreaties, the Government Office of Works instituted an investigation which resulted in the discovery of a bricked-up, and until then unsuspected, chamber, containing an ancient spinning-wheel showing marks of recent use. Reference to the old records of the palace showed this room to have formed one of the private apartments of Queen Jane. Both the late Lady Eastlake and Mrs. Cavendish Boyle, residents in the palace, have vouched for the appearance a few years ago of a white apparition, believed to have been that of Queen Catharine Howard, near the Queen's great staircase, and have graphically described the ghastly look of despair on her face and the blood-curdling sounds of her screams. And now we hear not only of a wholesale exodus of the servants employed at the palace, but even of its desertion by widowed ladies of rank, who, in recognition of services rendered by their husbands, have been accorded by the Queen free apartments there for life, owing to the antics of yet a third ghost who is, for some reason or other, believed to be that of Queen Anne Boleyn. It is all very well to laugh at this. But servants do not give up good places, nor do titled ladies of limited means relinquish so great and highly prized a privilege as free apartments in a royal palace for the sake of mere fancy or imagination.

Windsor Castle constitutes an exception to the general rule of royal and imperial abodes, in that it is absolutely free from ghostly occupants. The spectre of Herne the Hunter is, however, believed by superstitious people to roam under the oaks of the Home Park at certain times of the year. Buckingham Palace is far too modern a building to have a banshee of its own, while if Marlborough House were possessed of any spectral inhabitant it could only be the spirit of that imperious spouse of the first Duke of Marlborough, who is on record as having bullied to tears and into utter submission the good Queen Anne of glorious and pious memory. I have never heard of any supernatural apparition at either Kensington Palace or at St. James's, although the tragedies which have occurred within the walls of the latter royal abode, notably the mysterious murder of the Duke of Cumberland's confidential valet, Senlis, in the early part of this century, ought to be sufficient to people it from cellar to garret with spectres. At Holyrood the ghost of the murdered Rizzio, the troubadour admirer of Mary, Queen of Scots, is supposed to promenade the gloomy old galleries after dark, and it is noteworthy that whenever any member of the Queen's family is forced to spend a night in the capital of Scotland, a hotel is preferred to the royal palace.

The Little Red Man, who used to haunt the Tuileries before it was destroyed by fire at the time of the Commune, and his twin brother, who still appears from time to time as a precursor of death at the Grand Ducal Palace of Darmstadt, are too well known to need more than passing reference here, and the same may be said of the White Lady of the imperial Burg or palace at Vienna, and of her similarly-attired sister, who makes periodical visits to the old royal palace at Berlin. Much has been written about this White Lady of the Hohenzollerns, concerning the authenticity of whose appearances the late Emperor Frederick collected a wonderful array of records of the most convincing nature. There is in particular a sworn statement in the imperial archives, both at St. Petersburg and at Berlin, with regard to the apparition of the White Lady to Prince Frederick of Prussia and to a party of officers on the eve of his death at the Battle of Saalfield, in 1806. I have seen a number of stories about this White Lady of the Hohenzollerns, but none as yet which give any indication as to her identity. It seems that she was originally the Countess Agnes von Orlamunde, who murdered her first husband as well as her two children in order to be enabled to marry the Burgrave of Nuremberg, the ancestor of the Electors of Brandenburg and of the house of Hohenzollern. The triple murder is asserted to have taken place within the precincts of this palace, which was built 450 years ago, contains a thousand windows, and as many rooms as the number of years of existence.

The royal palaces of Lisbon, of Madrid, of Munich, Stuttgart and Moscow, have each a familiar banshee to announce the impending demise of a member of the reigning family. But perhaps the most uncanny of all of them is the royal palace at Stockholm, which has been haunted to such an extent since the assassination within its precincts of King Gustavus III, that it has been twice entirely razed to the ground and reconstructed, with the object of dislodging the supposed ghosts. If the royal princes and princesses of Sweden and Denmark and their respective suites are to be believed, these endeavors have been of no avail, as may be gathered from the description which they all unite in giving of certain apparently supernatural occurrences which took place during the visit of the Crown Prince and Crown Princess of Denmark and their children to the Court of Sweden last winter. It is said that on the night following the arrival of the Danish royalties at Stockholm, their chamberlain, Count Moltke, suddenly found himself thrown from his bed upon the floor with considerable force, and without being able in any way to account for the occurrence. On the following morning Prince Charles of Denmark, a big, burly and stolid young man, complained of having been awakened during the night by the noise of a scuffle at his bedside, for which he was likewise unable to account. A couple of evenings later Princess Louise of Denmark, the beautiful eighteen-year-old daughter of the Crown Prince, was writing letters in her *salon*, which was illuminated by lamps and a number of wax candles, when, suddenly raising her eyes from the paper, she caught sight of what she believed to be a spectre, standing at the other side of the table and gazing fixedly at her. The Princess gave a loud shriek and rushed from the room, the spectre, according to her story, darting ahead of her. In the corridor she swooned, and was found there unconscious by the attendants, who had been alarmed by her outcry. Nor did the twenty-three-year-old Prince Christian, eldest son of the Crown Prince, a stalwart young fellow of most manly character, escape an experience of this kind. For, happening to enter a room for the purpose of getting some article which he had forgotten there earlier in the day, he backed out of it, pale and trembling, declaring that the room was full of armed men who had forced him to retire. The last apparition was seen on the eve of the departure of the Danish royalties, when the Crown Prince and the Crown Princess of Denmark were playing whist with King Oscar and the Crown Prince of Sweden. The expression of the

latter's face attracted the attention of his partner. He had become as pale as death. His cards dropped from his hand, and his eyes protruded even more than usual as he gazed into vacancy. King Oscar, thinking that his son had become ill, seized him by the shoulder with the object of rousing him, whereupon the Crown Prince exclaimed that he had caught sight of the bood-stained apparition of some unknown person standing at the other side of the table, and that it had afterward glided out through the wall.

Of course, all this may sound ridiculous and childish to ordinary people who do not believe in the supernatural. But even they would experience an uncanny feeling if forced by circumstances to reside in houses which had been the scene of a suicide or of a murder. What wonder, then, that royal and imperial personages should entertain the same kind of superstitions and sentiments with regard to their blood-stained palaces, especially when it is borne in mind that the blood has in almost every case belonged to their more or less remote ancestors. EX-ATTACHE.

RONDA, SPAIN.

THE traveller in Andalusia — whether he comes leisurely from the north, or whether he merely spends the two weeks between the arrival at Gibraltar of New York steamers — is very apt to pass, on the newly-opened railroad between Algeciras and Granada, without taking much notice of it, a little station called Ronda. If his desire be to see rural Spanish town-life, pure and untouched by the stream of foreign travel, he makes a great mistake in being content with a mere glimpse of the neat, attractive station. And if his wish be to see interesting Moorish buildings and beautiful landscape, the tourist will do well to leave the train and spend a day or so in rambling about this quaint little town.

It is not easy to find out much about the past history of Ronda from the guide-books, for Finck and Hare have passed it by, and O'Shea gives but the briefest sketch. Certain it is that this was the dwelling-place of one of the Moorish kings, and a stronghold, until the fall of Granada drove the Moors out of Spain. Since then there has grown up a new town of Ronda side by side with the old, which has gained a reputation throughout Spain, not because of the beauty of its situation, nor because of its being the centre of a fertile, fruit-bearing region, nor for its Moorish heirlooms, but on account of its bull-fights (said to be the best in Spain), and also for its annual fair in May. It is situated upon a high rock divided in halves by a great chasm which marks the line between the old town and the new; and on the valley side the curious volcanic cliffs go straight down for over 300 feet so suddenly as almost to take away the breath of the unsuspecting visitor, who, strolling leisurely through the Alameda, steps out upon the terrace and looks over the railing.

The streets of Ronda are, for a Spanish city, quite clean, and so the sightseer can move briskly along, free to observe the typical Spanish caballeros, with their broad-brimmed sombreros and their long cloaks, one side of which is picturesquely thrown over the left shoulder so as both to protect the mouth and to show a bit of gay-colored lining. You rarely see one alone. The caballeros are always either in a group on the street corner, whispering as though imparting to a chosen few the secrets of the nation, or else walking silently two by two over the rough pavements, until you expect them to face about, form a half circle, and tell the audience their latest plot, conveyed in a Gilbert and Sullivan chorus. There is less air of mystery about the Spanish women, with their black-lace head-covering, but, when you see them in Ronda at their bay-windows, you cannot help wondering why it is they conceal their fine complexion under layers of powder until they have a fairly ghastly look. These windows project over the sidewalk, and here the women chat and gossip and sew and watch all passers-by, with whose faces their own are generally on a level. Every window, high or low, is heavily ironed and barred, and there are often two doors to a house, both of solid timber held together by great iron nails, so that each home is a little fortress. This appearance harmonizes with the fact that Ronda is avowedly the home of past and present smugglers, of ex-bandits and high-handed horse-dealers and bull-fighters, who trust not and are not trusted. Who knows but that it may have known a revolution or two in its time?

The bull-ring is a circular stone affair with a special box for royalty and seats for at least 3,000 persons. With certain claims to architectural beauty, it is nevertheless pretentious, and the whole has a shabby and neglected appearance. Interesting are the dark boxes or stalls in which the bulls are kept, until they are suddenly driven out into the glare of the arena to face the toreadores and their attendants. The doors are pulled up and let down, and the guide calls your attention to this simple arrangement in a way which shows how wonderful he considers it.

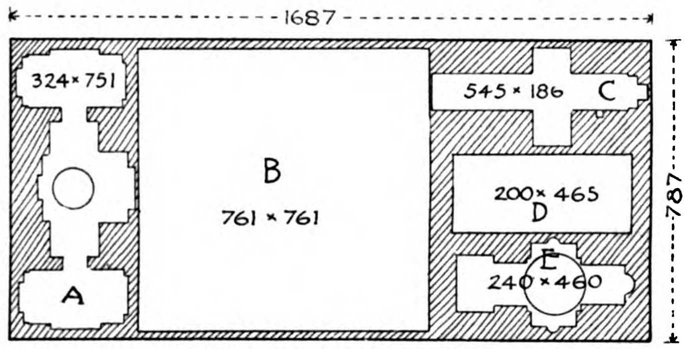
From the Plaza de Toros it is but a short walk to the great beauty of Ronda, the chasm between the towns, which is crossed at a height of 276 feet by the new bridge. Standing on this bridge of one span and looking down to the river below, it is impossible to imagine a more picturesque scene than that offered by the green-coated rocks which tower up on either side, bearing on their summits like white crowns the little houses, old and new. The narrow river pours itself in boiling cascades through the chasm out into the valley beyond, but on the way its waters are made to turn the wheels of various mills and of Ronda's only modern improvement, a tiny electric-light plant, and so attractively are these housed that the picture loses none of its beauty. On the contrary, the little white buildings, with their tile roofs, add greatly to the general effect as they nestle against the moss-covered rocks.

Beyond the bridge there comes into view the busy little market, with its quantities of fruit piled high upon the dirty cobblestones, and then the Larger Church, as it is called, towers up. This church, a relic of the Moors, is intensely interesting, for, originally a mosque, it still has at one end the great stone columns rising to the roof; the other half, evidently added after the Christian reoccupation, is distinctly Gothic. The various altars are heavily gilded, and are overloaded with images, vessels and pictures. In the centre is the choir of wonderfully-carved woods, containing a plentiful supply of the great tomes, music-books and bibles, which go back to the days when the monks turned out what books there were. Over one altar are two battle-flags of the time of Ferdinand and Isabella. Near by is the house of the Moorish king, Moro, which stands out among the smaller Moorish buildings around it. In the first of the two inner courts is the old well with its stone ornamentation, and in the other many of the original finely-colored tiles. A large dining-room or reception-room likewise has some of the original tiling. Its high window, suddenly thrown open, shows the house to be on the edge of the cliff, with that magnificent mountain panorama again before one. In the possession of this prospect alone has the house something which seems royal, according to modern ideas; it is sadly degenerating in the hands of its present owners, and in true Spanish style the pigs are kept in what was once a stately entrance-hall.

There are other things of value and interest to be seen — churches, towers, a monastery and the residence of the Marchese Montezuma — before Ronda's stores are exhausted. Of the varied views one cannot have enough. Even in the early gathering darkness it is a pleasure and satisfaction to walk through the narrow Moorish streets, over the old bridge, thronged with workers and their faithful donkeys on their way back from the fields, and up the hill to the comfortable hotel, where three youthful landladies preside. And the tables in the dining-room, heavily laden with the fruits of the earth, again bear witness to the prosperity of Ronda. — *O. G. V. in the N. Y. Evening Post.*

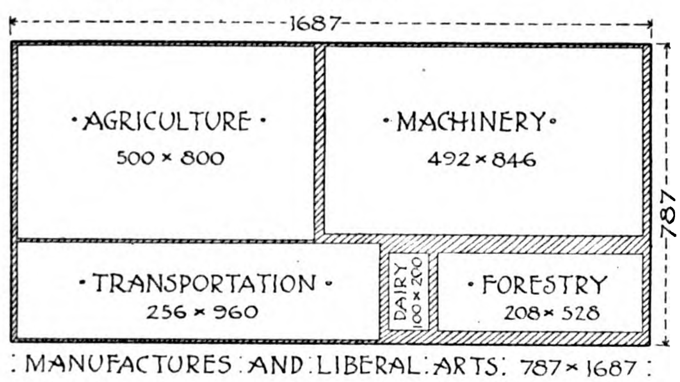
THE AREA OF THE LIBERAL ARTS BUILDING AT CHICAGO.

EARLY in the year, before we knew that circumstances would prevent our giving to the World's Fair the attention and space its character demanded, we prepared as part of an object-lesson these two diagrams which give in rather impressive form



Manufactures and Liberal Arts Building.

A. U. S. Capital. C. Winchester Cathedral. E. St. Paul's Cathedral.
B. Great Pyramid. D. Madison Square Garden.



[In this diagram the annexes of Machinery and Transportation Buildings are omitted.]

information as to the superficial magnitude of the largest of the Fair buildings. The companion diagram considering the sectional area of such buildings as could actually be placed under the roof of the big building never was finished.

STONE ROOF OF A CHAPEL IN COURPIER FALLS. — The arched stone roof of St. Pierre chapel, recently erected in Courpier, near Clermont-Ferrand, Puy-de-Dome, fell November 22, while many Sisters of Mercy were at prayers. Several sisters were killed, and others were injured severely. — *Exchange.*

ILLUSTRATIONS

[*Contributors of drawings are requested to send also plans and a full and adequate description of the buildings, including a statement of cost.*]

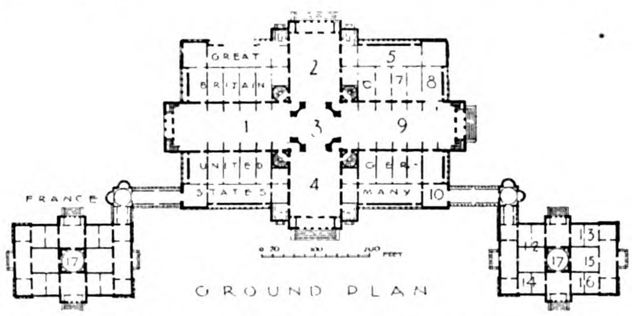
DECORATION OF THE CHANCEL OF THE CONGREGATIONAL CHURCH, PROVIDENCE, R. I. MESSRS. CARRÈRE & HASTINGS, ARCHITECTS, NEW YORK, N. Y.

[Gelatine Print, issued with the International and Imperial Editions only.]

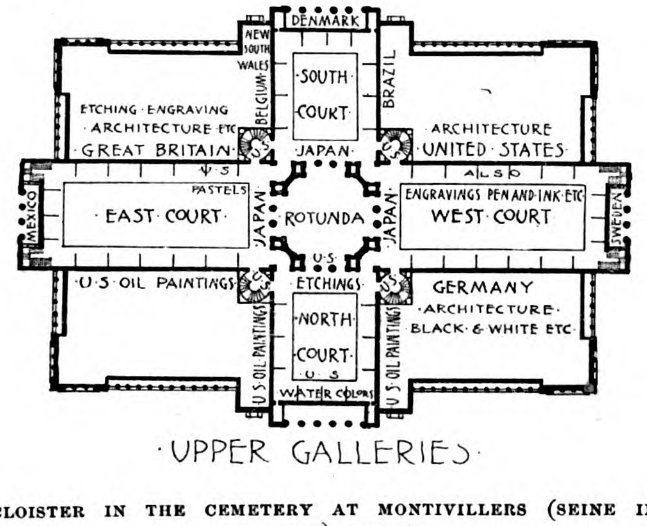
INTERIOR DETAILS FOR THE HOUSE OF THOMAS A. MCINTYRE, ESQ., W. 75TH ST., NEW YORK, N. Y.: THREE PLATES. MR. R. H. ROBERTSON, ARCHITECT, NEW YORK, N. Y.

[Issued with the International and Imperial Editions only.]

√ THE FINE ARTS BUILDING, FROM THE NORTH, WORLD'S COLUMBIAN EXHIBITION, CHICAGO, ILL. MR. CHARLES B. ATWOOD, ARCHITECT.



1. East Court: France, Architecture and Historic Sculpture.
2. South Court: France and England, Sculpture.
3. International Rotunda: Sculpture.
4. North Court: Germany and United States, Sculpture.
5. Russia.
6. Spain.
7. Japan.
8. Holland.
9. West Court: Germany, Spain, Italy, Sweden and United States, Architecture and Sculpture.
10. Austria.
12. Italy.
13. Denmark.
14. Belgium.
15. Norway.
16. Sweden.
17. Sculpture.



√ CLOISTER IN THE CEMETERY AT MONTIVILLERS (SEINE INFERIEURE), FRANCE.

√ WEST FRONT OF THE CATHEDRAL, BAYONNE, FRANCE.

√ "MADONNA AND CHILD," BY NICCOLO DELL' ARCA ON THE PALAZZO PUBLICO, BOLOGNA, ITALY.

[Additional Illustrations in the International Edition.]

CENTRAL EASTERN PORTICO OF THE MACHINERY BUILDING, WORLD'S COLUMBIAN EXHIBITION, CHICAGO, ILL. MESSRS. PEABODY & STEARNS, ARCHITECTS, BOSTON, MASS.

[Gelatine Print.]

JAVANESE THEATRE, WORLD'S COLUMBIAN EXHIBITION, CHICAGO, ILL.

[Gelatine Print.]

"WORK-HORSE AND NEGRO," STATUE IN THE COURT OF HONOR, WORLD'S COLUMBIAN EXHIBITION, CHICAGO, ILL. MESSRS. D. C. FRENCH AND E. C. POTTER, SCULPTORS.

[Gelatine Print.]

COURTS OF JUSTICE, YORK, ENG. MR. HUON A. MATEAR, F. R. I. B. A., ARCHITECT.

OUR illustration is of the principal entrance to the new Courts of Justice, York. The foundation-stone was laid by H. R. H., the late Duke of Clarence and Avondale, July 16, 1890, and the building was opened by the Lord Mayor, Alderman Close, in July, 1892.

HALTON, HERTS, ENG.: LOBBY TO WINTER GARDEN.

DRESDEN, AFTER A DRAWING BY SAMUEL PROUT.

NOTES AND CLIPPINGS

INROADS ON THE MAINE FORESTS.—That person who believes the Maine forests are holding their own against the inroads of the lumbermen is likely to be disappointed when the next report of Forest Commissioner Oak is made public. The collection of facts which are essential to a comprehensive understanding of the wild lands and forests of this State has been one of the features which Mr. Oak has taken up and persistently carried forward since coming to his present office. Last spring he employed an expert to make measurements of lumber in different parts of the State for the purpose of establishing beyond doubt the rates of growth in different localities and an average rate of growth. These facts being known, also the valuation of the timber lands and the amount annually cut off, the rate of depletion of the forests can be ascertained with a great degree of accuracy. The facts which he has already collected indicate, it is believed, a much more rapid decrease of the forests than would at first be supposed. The Commissioner would not attempt to say now what the rate would be, but told the reporter, "You may say that the statistics thus far obtained indicate that the decrease in the amount of lumber in the State will be a matter of surprise." Of course events are likely to occur to modify in the future these percentages. This coming winter, for instance, will see much less lumber taken from the forests than usual.—*Augusta* (*Me.*) *Journal.*

WHY WINDMILLS USED TO BURN DOWN.—Of the production of fire by the friction of wood against wood, windmills of the old construction gave, on a large scale, some disastrous examples. When the force of wind increased, the miller was obliged to bring each of the sails in succession to the ground, in order to "unclothe" it; but when sudden squalls came on this was impracticable, and the mill, in extreme cases, ran away, *i. e.*, could not be stopped. Everything was now done to increase the grip of the wooden brake round the great wheel on the driving shaft, and water was poured copiously over them, but in spite of all this, flames would sometimes burst out from the intense friction, and the mill be probably burned down as the result.—*N. Y. Times.*

THE PROPOSED RUSSIAN BELL FOR PARIS.—Careful examination of the towers of Notre Dame at Paris have revealed the fact that the offer of the Russians to present to the cathedral an immense bell to be called the "Bell of Peace" and weighing 100 tons cannot be accepted. The bell in question could neither be got into the tower nor would the latter have the strength to support it, for one of the towers already shakes ominously when the fourteen-ton bell presented by King Louis XIV is tolled. Its mate in the other tower was captured in Sebastopol during the Crimean war, and it is to be restored to that city, the new Russian bell being destined to take its place.—*N. Y. Tribune.*

A LAWYERS' STRIKE SUCCESSFUL.—The famous strike of the Lawyers' Corporation of the City of Riom, in Auvergne, France, is ended. One of these lawyers, or advocates, having been improperly treated by a judge, his colleagues sided with him, and for five months they have refused to plead before the court, which was practically closed. At last due satisfaction has been given to the Lawyers' Corporation by M. Oudoul, the president of the Court District of Riom, and the advocates have resolved, in a meeting, to resume again their avocation and pleadings in that court.—*N. Y. Tribune.*

ASSESSING THE EXPENSE OF FIRES IN GERMANY.—There is an equitable and sanitary rule prevailing in Leipzig, Saxony, that whenever there is occasion to call out the fire-department the expense is assessed upon the owner of the house where the fire started. This expense, as may be readily understood, is no trifle, and householders take every possible care to avoid incurring it. It is considered that this carefulness to a very great extent accounts for the infrequency of fires in that city.—*Invention.*

THE WORLD'S FAIR FINANCES.—The final report of Treasurer Seeberger on the World's Fair finances, was received and adopted by the Exhibition directors last week. By this report it was shown that the total disbursements of the Exhibition Company have been $31,679,045, while the total receipts are $33,594,147. Thus a balance of $1,915,102 is left to the credit of the company. On this amount, $158,356 is represented in souvenir coins at face value.

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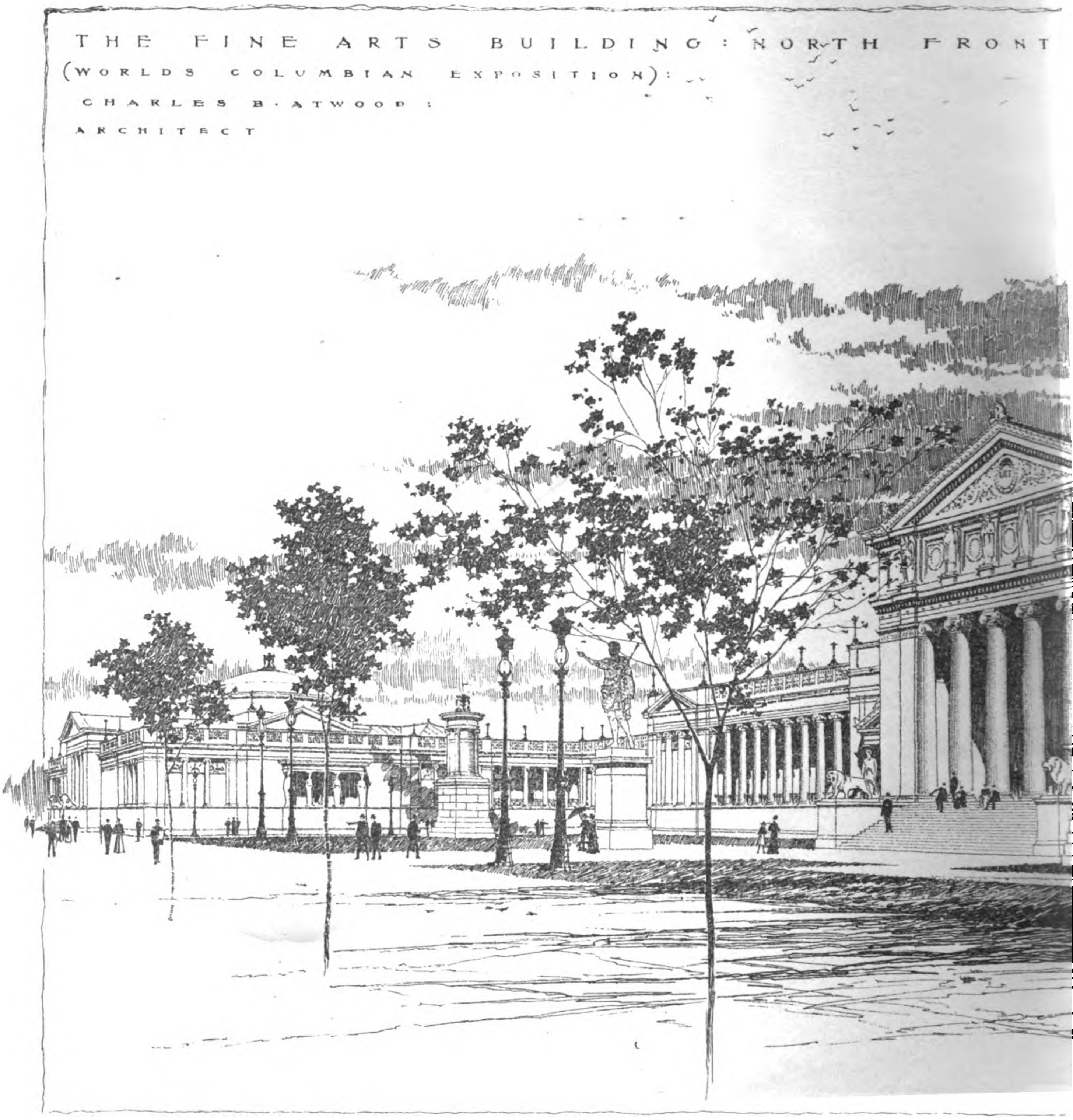
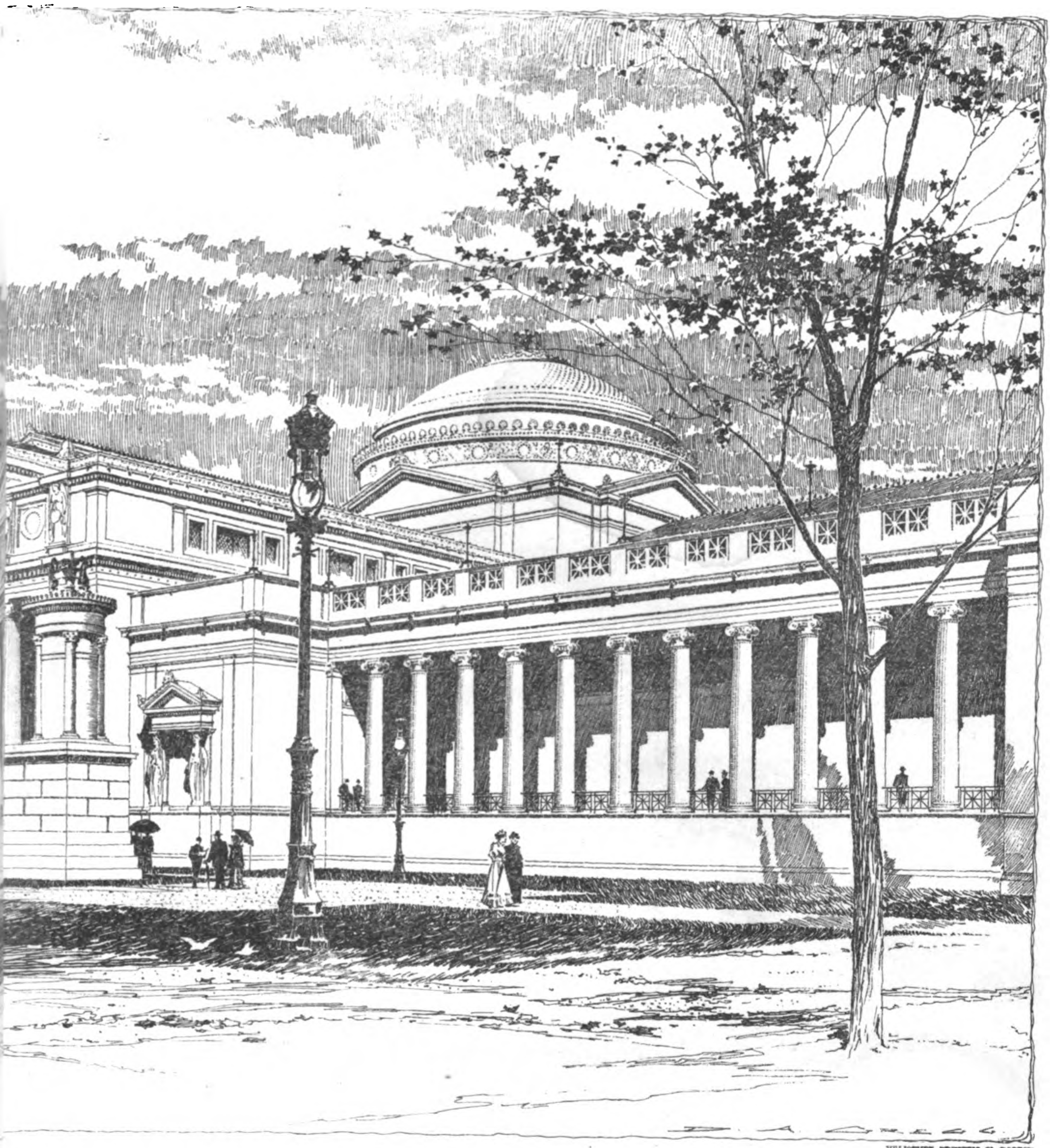


THE FINE ARTS BUILDING : NORTH FRONT
(WORLDS COLUMBIAN EXPOSITION) :
CHARLES B. ATWOOD :
ARCHITECT



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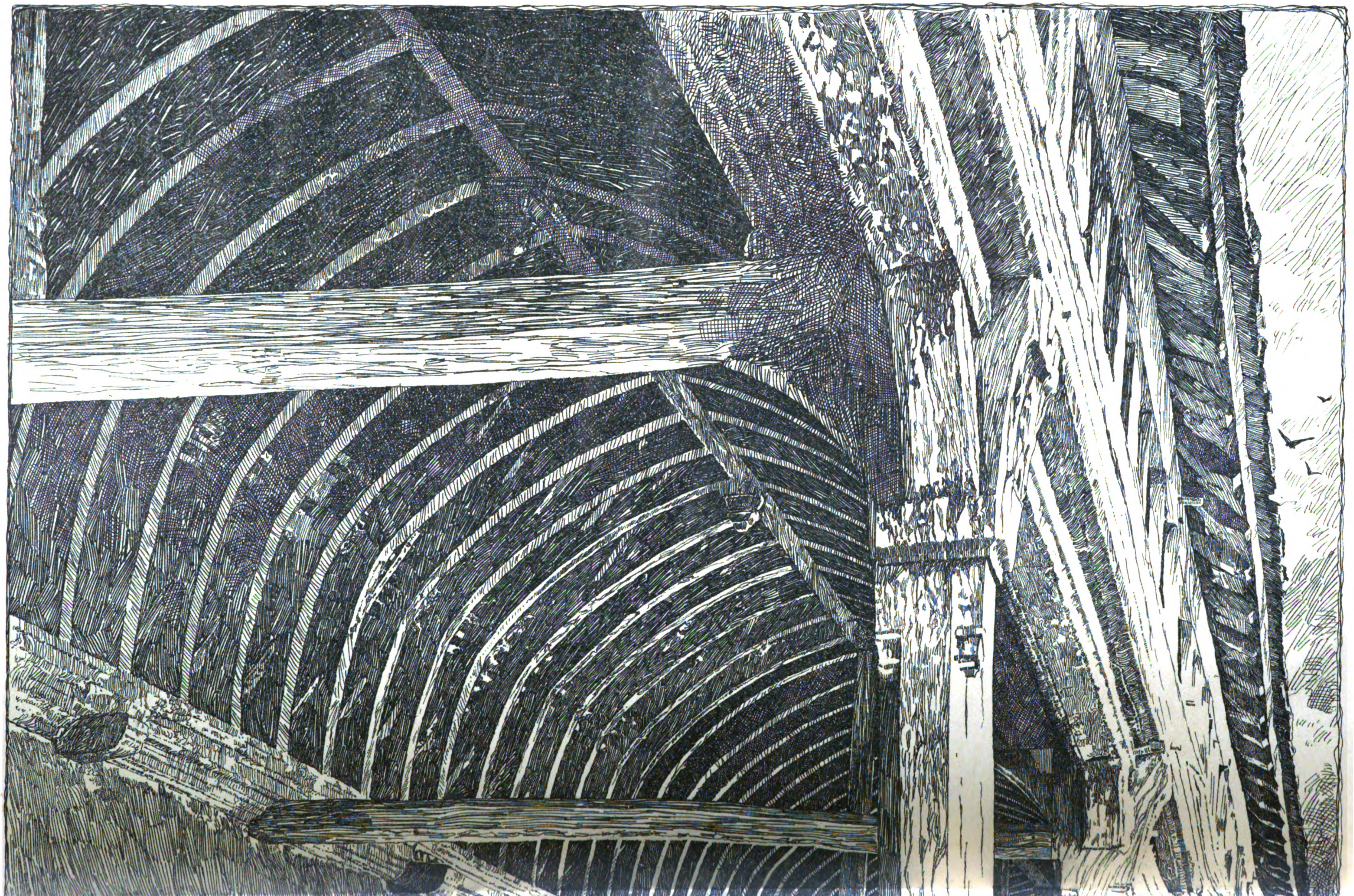

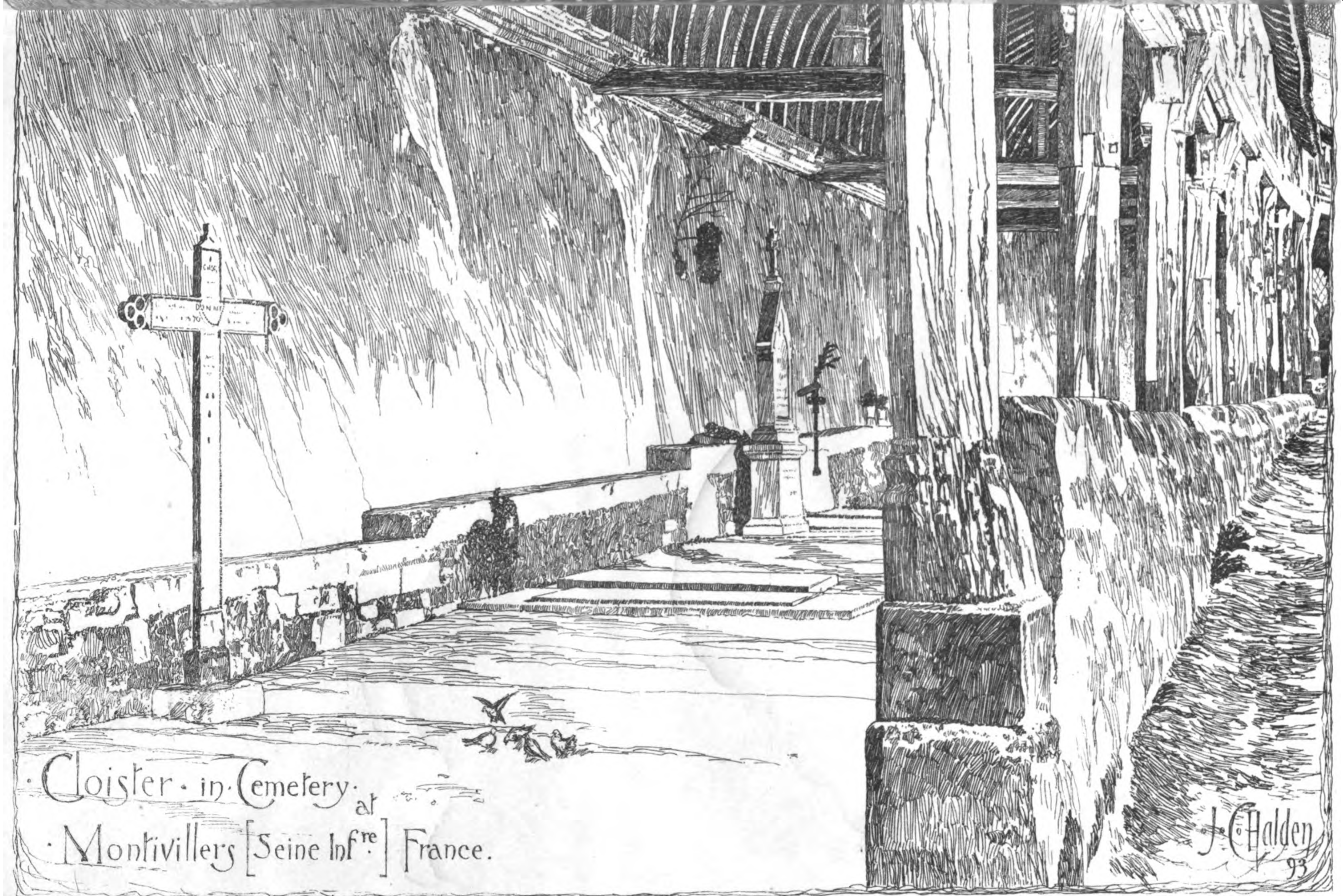
·Cloister·in·Cemetery· at
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J. C. Halden
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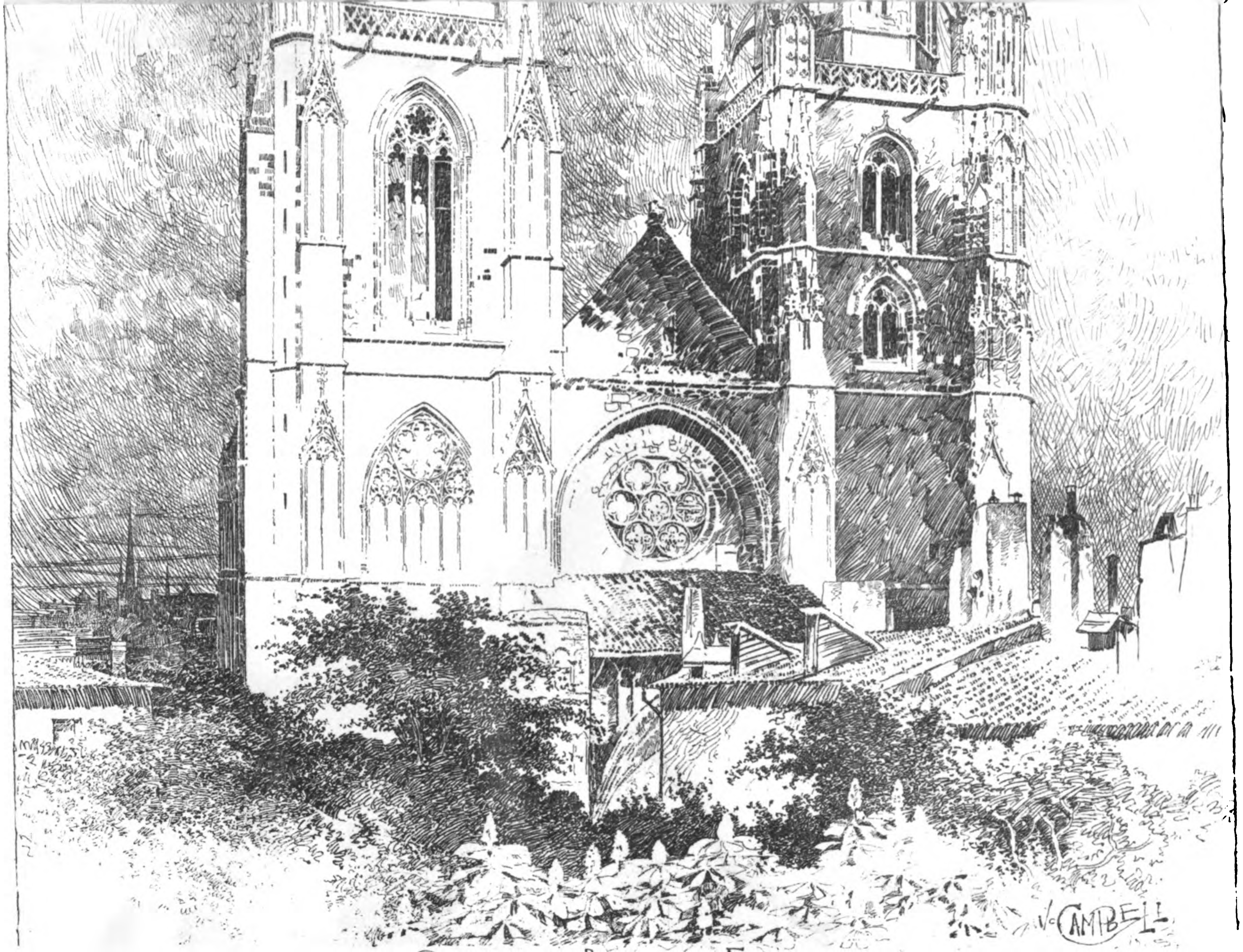

CATHEDRAL. BAYONNE. FRANCE.

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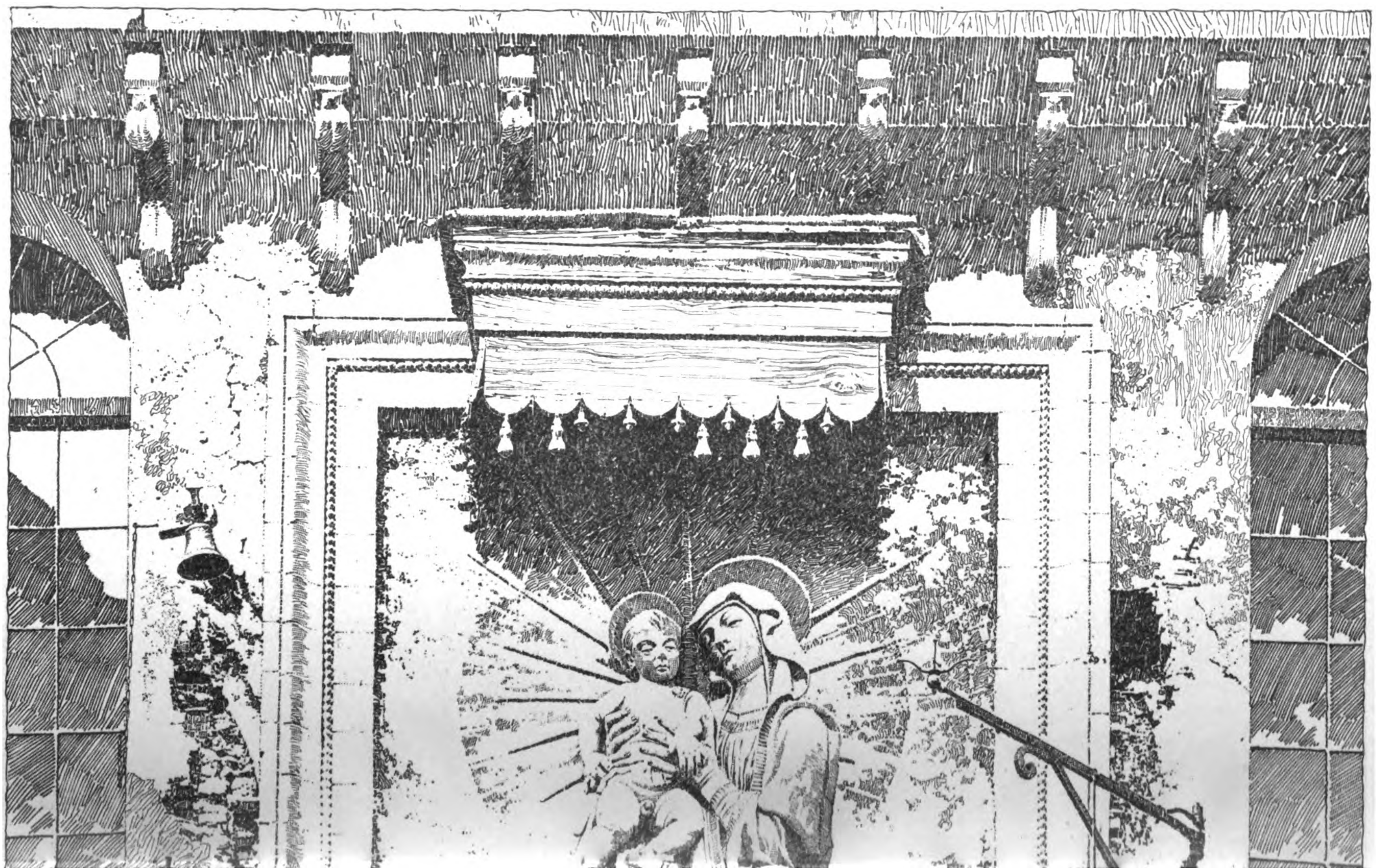

MADONNA AND CHILD, BOLOGNA, ITALY.

ON PALAZZO PUBLICO.

BY NICCOLÒ DELL'ARCA

THE AMERICAN ARCHITECT AND BUILDING NEWS.

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DECEMBER 30, 1893.

CONTENTS

A RATHER painful story of an attempt to "build cheap" is to be extracted just now from the Boston daily papers. It seems that, about three years ago, the Legislature of Massachusetts, after repeated applications from the Board of Lunacy and Charity, decided to build a new State lunatic asylum at Medfield. It was supposed that the buildings would cost somewhere about five hundred thousand dollars, and the Legislature appropriated five thousand dollars, or one per cent on the intended cost, "for preparing preliminary plans and estimates, and for the paying of the expenses of a commission to be appointed under the act to carry out its provisions." A commission of three persons was appointed, and instructed "to travel all over the country" for gathering information, and then to procure the preliminary plans and estimates. How much money was left to pay for plans, after the expenses of the tour of the commission had been defrayed, does not appear, but an architect was found who was willing to make some plans, which are said to have been skilfully arranged, and to have met with approval, not only from the commission, and the committee of the Legislature, but from hospital directors. In 1892, the Legislature, having, through the commission, purchased land for the purpose, appointed a board of seven trustees, to carry out the project, instructing the trustees to select from their number a building-committee of three members, who should have "complete control and management" of the building operations, and appropriated five hundred thousand dollars for the work. One of the members of this building-committee was a lawyer, the second was a jeweller, and the third was a mason and contractor. Working-plans were now the next things required, and, as soon as the committee had organized, it began to dicker with architects again. Each member of the committee had his man to propose. The lawyer advocated the employment of a young architect, who had official recommendations; the original architect was a friend of the jeweller, while the mason, who, as he says, feared that if the jeweller's friend were employed, he would be the "tool" of his patron, proposed some townsmen of his own. The idea that the designer of the plans which had been so unanimously approved, who was an architect of great experience and excellent character, had any claim to be employed to carry them out, never seems to have entered the head of any of the committee. As the suspicions of the committee, that the architects would be the "tools" of their respective advocates among the members, seem to have been mutual, the problem was solved by inviting bids from the three candidates for the work of carrying out the plans of No. 1. The contractor's friends do not seem to have entered with much ardor into the committee's views, for their bid was the highest of the three. No. 1 himself came next; but the lawyer's young friend was a thousand dollars lower still; and the "job" was awarded to him, the committee, however, making with him a contract, by which they reserved the right to discharge him at any time.

ACCORDING to the reports in the Boston papers, some curious proceedings followed these preliminary arrangements. A contract was first awarded by the committee to a local firm for the foundations of the water-tower, which were to be put in under the superintendence of the engineer employed by the committee, and subject to his approval. Soon afterwards, the mason, who, as the only practical member of the committee, was detailed to make frequent visits to the ground, discovered that the tower foundations were, as he says, being put in with rotten field-stone, instead of quarried granite, as specified; that clay was being used instead of sand, and that the cement was of inferior quality. What the superintending engineer was about when this sort of work was going on does not appear, but the practical committee-man reported in writing on the subject to the full committee. This step, which certainly seems justifiable, "won for him," as he says, "the enmity of the contractors," one of whom afterwards pursued him to the the hotel in Medfield, threatening and abusing him. The next contract, which was for the administration-building, was awarded to a firm, consisting of the junior partner of the belligerent stone-mason, and a man with little or no knowledge of building. The firm thus constituted sublet the contract, or a portion of it, to a man who was reported to have an interest in a large granite quarry in the neighborhood of the asylum grounds. About the same time, the contract for the pumping-station was awarded to another firm, which had an office in the same room with the first. While these things were going on, the lawyer member of the committee, according to his own statement, met the principal owner of the granite quarry just mentioned, who communicated to him the agreeable intelligence that he was going to make him a present. A few days later, the present arrived, in the shape of a check, which is reported to have been for fifteen hundred dollars, although the recipient does not seem to have mentioned the exact sum. What the lawyer had done to merit this donation is not quite clear, but he appears to have thought it to be a mark of gratitude for his services in securing the appointment of the young architect, in whom he supposed that the quarry-owner was interested, and, with that idea, he added it to his bank account. As the work went on, the rest of the committee, who had not received any corresponding marks of esteem from the architect's friends, became dissatisfied with the service that they received from him. Drawings, as they say, were delayed, and they imagined that there was an effort on the part of the architect to make the buildings cost more than the appropriation. It is hardly necessary to say that such suspicions are very apt to enter the heads of inexperienced men who find that an architect discourages their blissful anticipations of getting building-work done for less than it is worth; but when, after preparing their own estimates, which led them to suppose that the plan could be carried out for two hundred thousand dollars more than the original appropriation, they discovered that the architect had been before the committee of the Legislature, and had informed them that, in his judgment, a much larger increase would be necessary, they could no longer contain their wrath, and summarily discharged him.

THEN followed another chapter in the eventful history. The committee's relations with the contractors were not rendered any more agreeable by the removal of the architect, and, after prolonged altercations, the firm which had contracted for the administration-building declared open war, and appealed to the Governor and Council for the removal of the committee, alleging that they had without cause removed the architect, and were trying to substitute for him the original architect, the author of the plans; and, in general, that they were troublesome, unreasonable and malicious. The Governor and Council, after examining the evidence, began proceedings by demanding the resignation of the legal member of the committee. This was promptly tendered, but two weeks or so later the other two members were requested to

resign forthwith. The Governor accompanied his request with the comforting assurance that his action conveyed no imputation on the honesty of either, but, in his opinion, the "constant trouble and friction" which the committee had had, with the State authorities "and others with whom it had had dealings," had impaired public confidence "in the committee, and destroyed its usefulness."

WITHOUT pretending to criticise the action of the high State officers, who were certainly well informed on the subject, we cannot help thinking that, after the mistake had been made of appointing on such a committee three men who had no qualifications whatever for their position, for the practical knowledge of brick-laying possessed by one member cannot be considered entire qualification for conducting a great building-work of the most delicate and complex character, it is much to be regretted that it should have been found necessary to remove them at the request of the contractors with whom they had had "friction." While knowledge of the subject with which they have to deal, and tact in business relations, are excellent things in public officials, honesty is another equally excellent thing. If the State chose to dispense with the former, it should at least cling to the last, and, until the lowest bidder on public work becomes a different being from what he is now, an honest man cannot conscientiously supervise his work without some "friction." As in President Lincoln's story of the woman who thanked Heaven when she heard one of her children cry, because that was evidence that it was not dead, so, in public building work, "friction" between the contractors and those who have to look after their doings is a good indication that the supervision interferes with the profits of the contractors, to the advantage of the State. It does not follow that the public gain is in proportion to the violence of the irritation, but even a rusty tool that cuts is better than the smooth, edgeless blade with which the destinies of most of our public building-work are shaped.

THE noble order of the Knights of Labor has been undergoing a season of agitation, which has culminated in a change of officers. A few weeks ago, a meeting of the order was held, during which a member had the bad taste to rise, and, in a somewhat violent manner, charge the rulers of the association with general malfeasance, asserting that he would give particulars if he could get hold of the books of the order. Some of the books in question were lying on the officers' table, and he, in the heat of his zeal, made a dash for them. He was intercepted by some of the loyal members, and cheered on by the others, and the meeting broke up in tempestuous confusion. A season of private laboring with the iconoclast appears to have followed, for, at a subsequent meeting, he formally withdrew his charges, and harmony once more spread her beneficent wings over the mighty order. However, at the election, which followed, Mr. Powderly thought fit to decline further service, and Mr. J. R. Sovereign was elected in his stead, as General Master-Workman of the order, while an Executive Board was chosen, composed partly of the adherents of the former régime, and partly of the representatives of the malcontent faction. Mr. Sovereign is a comparatively young man, with a considerable reputation for energy, and shows indications of possessing a much wider range of ideas than his predecessor. There is no doubt that a man of sincerity and intelligence can do an immense amount of good in this position, and Mr. Sovereign will have the support of the whole country in everything that he can accomplish for his fellow-workmen which does not involve the plottings, and blackmailings, and wanton violence, and secret missions, and accusations, and hushings-up, and the general air of mystery and conspiracy, which have, at times, made the former administration worse than ridiculous.

ONE of the heaviest loads which the Knights of Labor, like all other labor associations, will have to bear is the connection which they have allowed to be established in the public mind between them and the bomb-throwing assassins who are getting to be the most conspicuous element of modern life. After the last exploit of one of these lunatics, he French Socialist journals hastened to explain that their onstituents had no sympathy with such manifestations, but the fact nevertheless remains, that the principal labor-unions, both in this country and abroad, have again and again officially expressed their regretful respect for the memory of the Chicago Anarchists, the basest and most cowardly of the whole tribe, while Anarchist doctrines are constantly and industriously disseminated among the labor organizations by means of newspapers and orators. So far as can be perceived at present, the prospect is that crimes of what may be called scientific violence will increase, and it is certain that there is no possibility of guarding against them. With our present knowledge of chemistry, any man of moderate scientific attainment, with a few hundred dollars, could contrive means for destroying many thousands of innocent lives at once. So far, the persons possessing this knowledge have not thought of using it for such horrible purposes, but the advance of education has begun to bring it within reach of a class of people who have a monomania for murder. There are plenty of these, who, for the most part, content themselves with writing to the Labor journals directions for manufacturing nitro-glycerine at home, and for making bombs, and throwing them effectively at "capitalists," or "hireling" policemen; but, as the sport of destroying life becomes safer for the sportsman, and more deadly to his game, these Anarchist gentry will not be able to resist the temptation to take a hand in "overthrowing the social order" for themselves. When this time comes, there is no fear that the honest and good-hearted men who form the vast majority of the members of all labor organizations will not repudiate with horror the companions who have forced themselves into membership with them, for their own purposes; but it would be still better for them to open their eyes now, before they become, in the eyes of the world, accomplices in the crimes which are daily proposed to them, and refuse, openly and consistently, to give any countenance to the people who advise them to better their condition by crime.

M. SALOMON REINACH has a short article, in the *Chronique des Arts*, on two new attempts at restoration of the Venus of Milo. The first is that proposed by M. Furtwaengler, Conservator at the Berlin Museum, in his new work, the "*Masterpieces of Greek Sculpture.*" In this book, Furtwaengler maintains that the left hand of the statue held an apple, and was supported by a little column, on the capital of which the elbow rested. The right arm, he thinks, hung at the side, with the right hand in contact with the drapery. An artist would hardly have chosen such a pose for a figure intended to be beautiful, but M. Furtwaengler points out that there is an intaglio in the Berlin Museum, representing Aphrodite in such an attitude, and that the coins of Milo show a figure of Fortune in a similar one. He thinks that the statue was executed about 100 B. C., in imitation of a work of Scopas. The second theorist, Mr. Bell, a well-known English sculptor, thinks that the statue stood in a theatre, in the capacity of *Venus Donatrix*, or Dispenser of Prizes, and that she held a laurel wreath in each hand, one hand being extended, while the other hung at the side.

M. REINACH finds it impossible to agree with either of these conjectures. Mr. Bell's is defective, in that there is no antique precedent for a figure holding two wreaths, while it ignores the fact that fragments of the left arm, with the hand holding an apple, were found with the statue. M. Furtwaengler's idea, that the statue belongs to so late a period as 100 B. C., hardly accords, M. Reinach thinks, with the "marvellous suppleness" of the workmanship, which is unlike anything else known of that date, to say nothing of the ungracefulness of the composition which it suggests. Mr. Stillman may have something to say on the subject which would be interesting, but, to persons outside the archæological pale, it seems as if a skilful figure draughtsman, like many of the Parisian painters and sculptors, could tell in a moment whether the figure was intended to have the left arm outstretched without support, or whether the elbow of this arm rested on a colonnette. Indeed, independent of the difference that there would be in the balancing of the figure for the two positions, there ought to be enough left of the shoulder, if not of the deltoid muscle of the left arm, to show whether the contraction indicated the holding of a weight in the outstretched hand, without intermediate support, or the resting of the elbow on some substantial object.

MUSEUM OF NATURAL HISTORY.[1]—II.

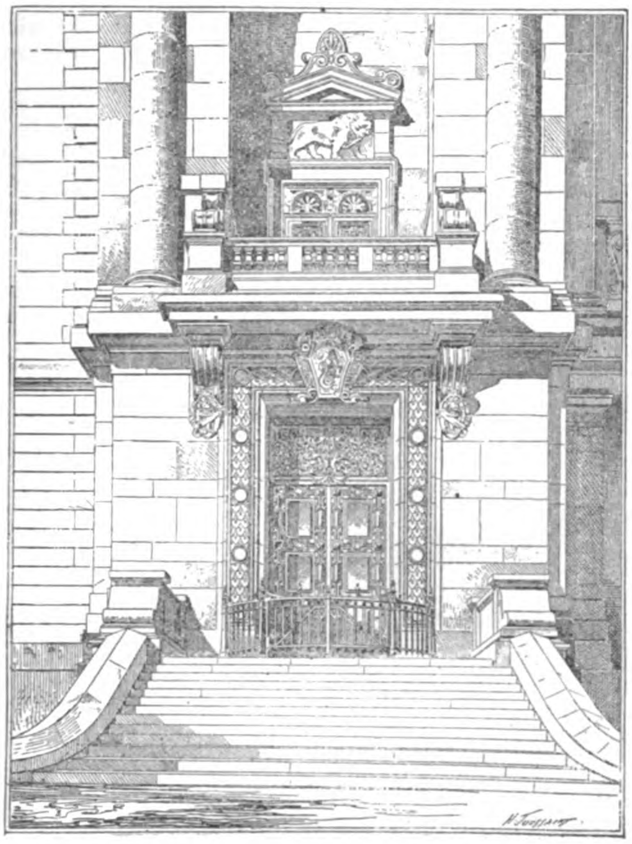


Fig. 3. Details of the Façade.

THE architectural decoration is of the plainest. It is, in fact, useless to try to make the rooms of any museum interesting otherwise than in the objects exposed. The ornamentation, therefore, allows only of the indication of the construction; but instead of leaving in view what might be termed the skeleton of the edifice, the architect has tried to clothe it with a more pleasing form, though a simple and

Fig. 4. Tribune of the Main Gallery.

rational one, beneath which can be detected the internal structure, as the skeleton beneath the muscles of a well-proportioned human body.

In the first story is the principal gallery, signalized on the façade by the grand Corinthian order. This is the hall of honor of the Museum. An admirable ornithological collection is exhibited in it. The vaulting, built of iron, has a double curve. Here, too, the finishing is such as to enable one to divine the construction beneath the plaster. There are no embellishments, no useless nor conventional projections. The springing of the arches is merely indicated by a well-disposed console.

The large doors at both ends of the hall open on the first landing of the staircases. The second turn takes the visitor up two-thirds the height of the gallery, which is materially higher than the gallery on the ground-floor. At these points, the architect has introduced tribunes from which one may get a general view of the hall, its dispositions and contents, as well as a pretty perspective effect. They are over the two doors and furnish also decorative motives, in woodwork, at the two extremities of the apartment.

It is from this intermediate story, on the right and left of the tribunes, that the stairway with a double flight of steps begins which accommodates the third and upper gallery; the roofs are very high, enabling the architect to establish on

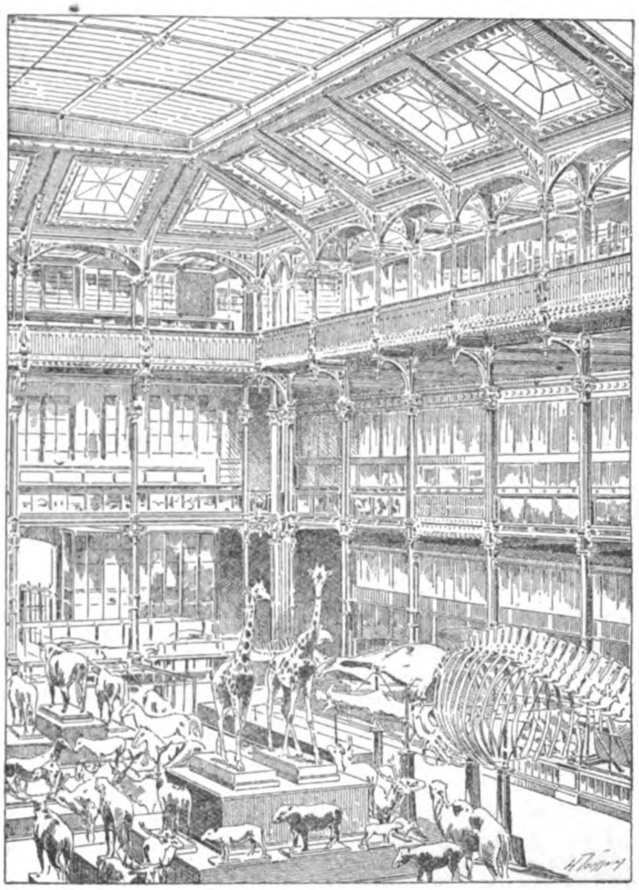


Fig. 5. Zoölogical Gallery.

the same plane with the other two a long hall six metres in height. Light is admitted from above and falls vertically on the collections of small animals gathered there.

We have said that the centre of the composition was a large hall lighted through a glass roof. This is really the *museum* for the vast quantity of objects exposed here, and it is also, perhaps, the most interesting part of the edifice from an architectural standpoint. The problem of covering great spaces with iron was solved long ago, but these immense structures often have only a provisional character or one of simple utility, and the forms, while remaining such as are proved necessary by mathematical calculations, seem indeed to be merely the materialization of an algebraic formula. Though it may be true that construction in iron is making constant progress, can the same be said of the architecture of iron? Everything here is still to be discovered or invented. New forms must be applied to a constructional process that is still quite undeveloped. It would be a mistake to endeavor to reproduce in metal the dispositions adopted for stone or wood. In this respect the great hall of the Museum marks a move in a new direction, and every attempt of the kind will advance this art for which no tradition exists.

[1] From the French of Pierre André, in Planat's *Encyclopédie de l'Architecture et de la Construction*. Continued from No. 939, page 144.

The hall roof is borne by forty cast-iron columns which likewise support the galleries or tribunes extending entirely around it. In the tribunes, which are eight metres wide, a large number of glass cases are placed. At the centre, standing on the floor, are the specimens of the larger animals; the smaller ones are disposed in the different stories, with insects and small crustaceæ at the top. The light, which is admitted from above, is thus favorable for examining the most delicate species in all their details.

The floor of the hall is raised along the walls six steps above the centre. This disposition enables one to get a general view of the collections from the ground-story. A still more striking general view is obtained from the other stories, where care has been taken to leave open spaces along the outer balustrade of each gallery, from which the visitor can look down upon the central scene.

The columns, which start from the floor, are light, as they must not obstruct the view nor mask the dimensions of the room by their bulk. Strengthened at the base, their decoration is also the expression of the construction, for their slightly cruciform section is that which offers the best resistance and which avoids also the inconveniences that may attend the casting of hollow columns. The points of support, five metres apart, have been brought nearer together at the angles; this disposition is pleasing to the eye and is necessary in order to assure the stability of the construction.

There might be some difficulty in joining the roof to the vertical walls of such a room; to do away with all stiffness at the angle, the architect took a fancy to corbel out the upper gallery beyond the pillars, while at the same time allowing the latter to run straight up from the floor. At the outer side of the corbelled portion are fine cast-iron columns which unite by means of a great openwork console with a slanting section of the roof lighted through large, glass caissons. Lastly, the roof above the centre is slightly curved. There is no stiffness, no sudden break in the lines, the eye follows the form of the room from floor to roof.

Two main public stairways and numerous service stairways accommodate the different stories. Each of the two grand staircases occupy a rectangular cage, 11 metres by 8.50m., rounded in a vigorous style at the angles. The disposition of the steps, 2.50m. in breadth, and their easy slope (1.14m. x 0.40m.) greatly facilitate circulation. The first flight is of stone and is borne on a supporting wall surmounted by a balustrade. The rest is constructed of iron, with wooden steps.

It is always difficult to join the metallic part of a construction to the stone; usually the two materials seem to be juxtaposited and not united, as the decorative elements are essentially different in them. For this reason, the harmonizing of the iron part of the spiral staircase with the first flight of steps had to be most carefully studied; the architect has endeavored as in the large hall, to give to every part an ornamentation fully in accord with the material used. The notch-board, with its fine mouldings in the straight portions as well as in the curved, the iron balustrade, with its supports corresponding to the division of the steps, the hand-rails along the walls, varying for the straight and slanting sections, in a word, the smallest details have all been made the object of special thought. The under sides of the flights are also simply and appropriately decorated. Thus, without any useless display of luxury, the architect has endeavored to give each object its suitable expression.

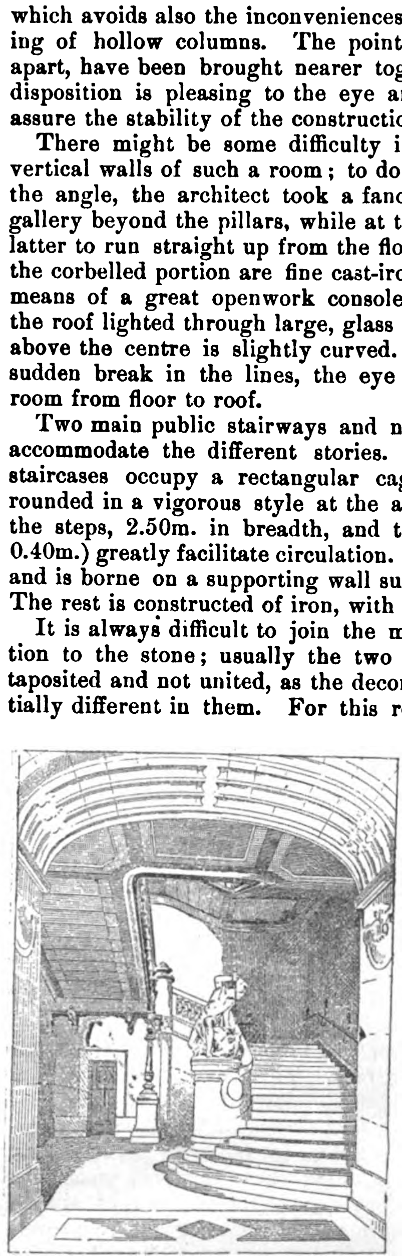


Fig. 6. Lower Part of the Staircase.

The impression produced by the edifice is that of a solid, substantial structure, luxurious only in the minute care brought to bear upon the conception. Nowhere does a conventional or an exaggerated decoration appear to annoy the eye. The architect has demonstrated his skill in converting into compositional motives the smallest requisites of construction or utility. Is not this the true architectural art as it is now understood?

PIERRE ANDRE.

REGENSBURG.—II.[1]

Entrance to the Rathhaus.

A FAR more interesting building is the Jacobsor Schotten Kirche, a simple basilica with nave and two aisles, and very similar to the church of the same name at Bamberg. It formed part of the Benedictine convent founded by some Irish monks, and was finished about the year 1180. The roof of the nave is flat, but the aisles are vaulted. The single-shaft pillars of the nave are surmounted by capitals with all manner of grotesque sculptures — lions, monks bearing burthens, women carrying baskets of fish, whales, dogs, pigs, dragons, and the like. On the right of the door is a curious bas-relief of a porter, one Ryden; and upon the high-altar a Romanesque and somewhat rudely carved wooden crucifix of the twelfth century. The church has been very well restored (1871–73) and richly decorated with frescoes both at the east and west ends. The western apse is used as a baptistery.

The portal is at the north side, and is a most curious specimen of Romanesque symbolic sculpture. It was built in 1110 and represents the triumph of Chistianity over Paganism in a series of bas-reliefs. In the centre is a large figure of our blessed Lord with the book of life; on each side the twelve Apostles go forth two and two, to preach the Gospel. The eight figures supporting the slab above are the fathers, as pillars of the church. Three monks with books are the wandering preachers of the Faith, who brought the Gospel to Germany — probably St. Boniface and the Irish founders of the monastery. Below this, the Church, as a woman with the body of a fish (the symbol of purity, as it can only dwell in the pure element, water). The Incarnation is symbolized by a lion which vomits a young one, and its fruit, as a dragon which is forced to give up its power over the world. The Resurrection is, of course, Jonah thrown up by a dreadful beast with the head of a whale and the teeth and tail of a crocodile. The faithful tread under foot those who have no part in the Resurrection, the heathen, represented as basilisks, dogs and swine. The lion devouring some animal is a symbol of the glory of the Lord in overcoming His foes. Around Him we see the redeemed, joyful and triumphant; on the other side the wicked bearing their punishments. In the tympanum is our blessed Lord as Prince of Peace, surrounded by ten lions.

"How are the mighty fallen" might be said of Regensburg in general and of its Rathhaus in particular. When we think of the mediæval processions winding in and out of the tortuous lanes and alleys, and of the old town-hall which, for 143 years witnessed the sittings of the Diet, how exceedingly commonplace and dull the ancient city has become. Who that has the smallest grain of imagination can help picturing to himself as he walks up the steps of the Rathhaus, the magnificence of the members of the Imperial Diet as they wended their way up those winding stairs to the great hall: the Imperial Provost, the jester of the hereditary marshal, accompanied by servants in yellow liveries and other satellites in silken mantles; the Imperial Quartermaster, the hereditary marshal, and all the foreign ambassadors; the abbots and bishops, the princes and other

[1] Continued from No. 938, page 135.

representatives of the Holy Roman Empire, all of them clad in the most gorgeous of robes. Who is there that would not like to be wafted back into the seventeenth century just for one short day? But although we cannot conjure back the inhabitants, we can gaze upon the hall in which the sittings were held, and rest upon the old benches which were formerly occupied by the members. In the

Street leading to the Rathhaus.

centre, at one end, is the Imperial throne, an armchair, and at the other end a gallery for musicians. Along both sides of the hall are rows of square windows, each with four lights; and in the centre, upon the side of the street an oriel-window built out upon an upright support.

The oldest part was built about 1330, and the great hall finished in 1408. In 1810 a silent witness of the brutality of our forefathers was removed — an iron cage which had been erected and placed under the balcony in 1559, as a receptacle and temporary lodging for disturbers of the public peace and other vagabonds, and evil-minded women folk. In front of the old building many a scaffold was erected, where those who survived the torture-chamber in the dungeons were put out of their misery. And Regensburg, like many another city, killed its best friends: Wolfgang Roritzer, the master-builder of the Dom, the embellisher and beautifier of the town, suffered death there in 1514, for no greater crime than adherence to some unpopular political opinions.

In the Nebenzimmer are a number of flags and banners made for the town militia by order of Bernhard von Weimar, many portraits of city worthies, curious pictures of the Regensburg of yore, and a splendid yellow silk damask canopy embroidered with the Imperial arms, which was borne over the Emperor Mathias when he made his entry into the city in 1613.

In the Modell Kammer are some very curious working models of churches, gates, and the old bridge as it appeared in 1724, the latter particularly interesting as showing its drawbridges, its three turrets, and the portion which formerly descended to the island Wöhrt. The upper and lower Wöhrt were originally one island, but in 1304 the Danube overflowed the narrow tongue of land between them, and it is also to an overflow of the river in 1784 that the old bridge owes the loss of its central tower; the third, that on the Stadtamhof side, was destroyed as late as 1809.

The tapestries are well worth minute study. The oldest, of the fourteenth century, consists of twenty-four medallions of love-scenes and inscriptions, as for instance, Tristan and Isolde. In between these are fantastic figures and ornaments worked upon linen, but much destroyed. Another, of the first half of the fifteenth century, represents "Frau Venus" (she who lived in the caves of the Hartz Mountains) surrounded by her court, as she received Tannhaüser. (A part of this tapestry is in the National Museum at München). A third piece, also of the fifteenth century, is a complete mine of wealth for the history of painting and the symbolism of the Middle Ages. At a period so bestained by war and bloodshed, it was a common conceit to represent upon tapestries, not material battles which were settled one way or another by the belligerants, but spiritual struggles, the endless fight undergone by all men, between good and evil. Thus we see arrayed upon one side the cardinal virtues in the form of delicate maidens, and upon the other, hideous beasts, bearing arms, the symbols of the vices. Pride rides upon a prancing horse to meet Humility, a young and delicate maiden. Pride has a triple crown adorned with a peacock fluttering upon the crest; Humility has her head decked with flowers. Pride carries a shield with a lion for device, and a flag bearing an eagle — his legend is:

Ich bin hoffartig und verwegen,
Und tret ich nieder was ich sehen.

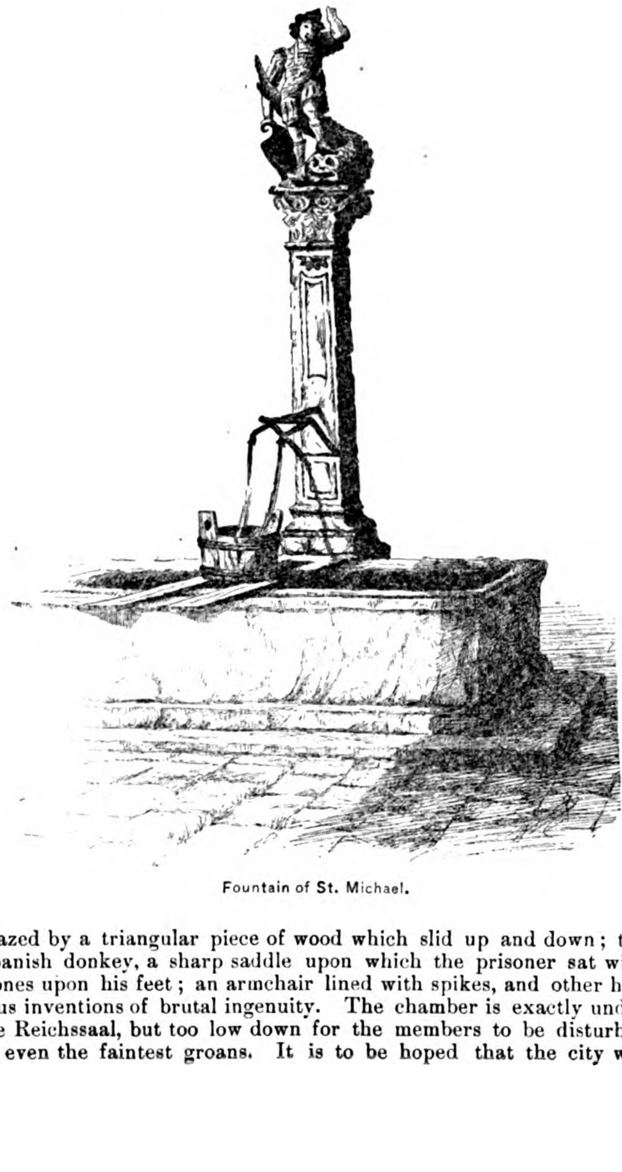
The sweet maiden, Humility, bears a shield with an angel as device, and on her flag a picture of Christ — her legend is:

Ich hoffe dich zu bessern.
Wenn bessern hochfart dich lau.

Upon the opposite side, Faith, Hope, and Charity defend themselves against Unbelief, Despair, and Hatred, who are vigorously attacking the castles of the Virtues.

The fourth tapestry represents the wild people, who, according to the superstition of the Middle Ages, dwelt in the deep forests.

The dungeons are as complete in all their ancient horrors as those of the Doge's palace, perhaps more so, as the torture-chamber remains just as its last owners left it. Down many steps we come upon a series of underground cellars, perfectly dark, and without any means of proper ventilation. The cold (in summer) is intense, and the dampness chilling. In the centre of one dungeon is a trap-door through which the prisoner must have been dropped, as there is no other means of communication. If he were allowed to live in such a tomb, food must have been let down through the same hole, but it is more probable that, like the *oubliette* at Chillon and other places, it was a means of getting rid of a prisoner; he dropped out of life as it were, and was forgotten. The torture-chamber is a lofty dungeon with one side partitioned off by a trellis-work screen, behind which the judges sat unseen by the culprit, but hearing all. At one end is the seat for the doctor. In the centre is a rack, an upright ladder, up and down which the victim was pulled so that his back was



Fountain of St. Michael.

grazed by a triangular piece of wood which slid up and down; the Spanish donkey, a sharp saddle upon which the prisoner sat with stones upon his feet; an armchair lined with spikes, and other hideous inventions of brutal ingenuity. The chamber is exactly under the Reichssaal, but too low down for the members to be disturbed by even the faintest groans. It is to be hoped that the city will

always preserve the dungeons in their present state, if only as an example of the manners and pleasant customs of the good old times which so many folks affect to lament.

English people may be entertained by the tradition that in 925–30 a great fight took place in the Haidplatz, between a citizen named Dollinger and a knight called Krako, a Hun, in the presence of Heinrich I and St. Oswald, King of Northumberland.[1]

Some of the ancient laws and customs of the city are curious reading, as, for instance, one of 1320, forbidding the citizens to go out without a lantern after the ringing of the curfew; and even although armed with a feeble light, the grandfatherly government preferred the people keeping at home by reason of the frequent disorders which took place. The town was not publicly lighted until 1783. As in so many old German towns, a watchman still passes the night upon one of the towers, to ring the tocsin in case of fire, though not, as at Göttingen, blowing a horn every hour to show the inhabitants that he is still awake and watchful.

In 1659 punishment in the shape of a fine was accorded to those who, like Michl Sieber, were continually boozing in the beer-shops and leaving their wives and children to hunger. In 1522 thieves were deprived of their ears or were drowned; a boy who had stolen the veil and ornaments from a statue of Our Lady in the cathedral, was beheaded. And yet in spite of these severe punishments the candle-sticks in the Dom had to be chained. Deserters also had their ears cut off and lost the freedom of the city forever. Those citizens who evaded paying the taxes on bread, meat and fish, or who sold short weight were compelled to spring into the water, which must have been certain death if the Danube were as swift then as now. In 1558 it was forbidden openly to sell noxious melons and potatoes, and brewers were punished for selling bad beer by having the casks and their contents thrown by order of the magistrates from the tower of the market-place into the Bach below.

In 1612 Kaiser Mathias made a grand entry under the canopy of yellow damask mentioned above. The poles supporting the drapery were ornamented with silver-gilt eagles. The Emperor wore a gold-embroidered robe bordered with pearls and precious stones, a mantle of orange-colored damask and a white hat and heron's plumes. Round his neck hung the order of the Golden Fleece. He rode upon a dun-colored horse whose harness and saddle were also decorated with pearls and jewels. After him followed the Empress in her bridal coach and surmounted with a golden crown and lion rampant and driven by a coachman arrayed in golden damask. The "*goldamastenen Himmel*" was borne by six members of the Council, and the whole procession, numbering hundreds of men and 1,886 horses, wended its way to the Dom where the Emperor was received by the ecclesiastical authorities, including six bishops. But these pageants were very costly to the citizens, as it was the custom to compensate the exalted personages for their trouble by presents in money and in kind. On the above occasion the Kaiser was offered a goblet as high as the table, filled with 500 pieces of gold, also two wagons of wine, two of oats and four tubs of fish; the Empress was also presented with a goblet of gold-pieces and the same quantity of wine and oats and three tubs of fish. In 1636 Ferdinand III was crowned king in the Dom and elected future Emperor, and upon this occasion the streets were covered with red, white and gold cloth from the Bischofshof to the Cathedral and from thence to the Rathhaus. A proclamation, given amidst the thundering of cannon, invited all the notables to a banquet at the Rathhaus. The Emperor was carried upon a raised chair under a canopy, resplendent in Imperial robes, crown and insignia. Following him came the newly-crowned king under another canopy and surrounded by the nobility. In the square in front of the town-hall stood a fountain from which red and white wine spouted. Hard by, a hut was erected wherein an entire ox was roasted, and near it a pile of oats was heaped up. Coronation coins were thrown to the people, and after the close of the entertainment the drapery and the remains of the ox, the wine and the oats were distributed amongst them.

Soon after this pageant, in 1653, the coronation of the Empress Eleonora and King Ferdinand IV took place.

Besides these Imperial festivities the citizens frequently witnessed processions of the trade guilds, but although eating, and drinking, and dancing were indulged in, no music was allowed except that which was quiet, "stille musik," such as fiddles and flutes.

Regensburg, like many other places, had its boy bishops; but the "*Bischofsspiel*" seems to have been unconnected with any particular festival; and instead of taking place, as at Salisbury, on St. Nicholas Day, it was a movable feast depending upon the election of a new canon. The scholars accompanied their bishops about the town; but as early as 1249 the abbot complained so bitterly of their misdeeds, the smashing of doors, the carrying off of cattle and horses and other similar misdemeanors that in 1357 the custom could be endured no longer and was finally abolished.

Another custom which, like amateur theatricals, was doubtless very amusing to the actors, was continued for some centuries longer: Upon Shrove Tuesday young men went about in masks carrying an ox's skin into which they dexteriously flung the passers-by, tossing the unfortunate captives up and down. The object, of course, was to demand blackmail, and as the Jews were the principal persons attacked, the maskers naturally reaped a considerable harvest.

The town council devoted much attention to trade and commerce. Handicrafts gave their names to many of the streets, leather-sellers, lock-smiths, cutters, wool-carders, weavers, etc.; and the fame of some of their craftsmen was known all over Europe and in the far East. This was especially the case in smithing. In 1456, the Hungarians ordered 100,000 arrows of a famous smith called Hebrant. In the "*Annolied*" a Regensburg helmet is mentioned, and in the "*Rolandlied*" Ganelon carried the "*beste Sahs*,"[2] the work of one Madelgers, a Regensburg smith. All over the town there are innumerable specimens of exquisitely fine wrought ironwork, in the way of grilles, signs, door-hinges and the like; indeed all over Bavaria, even in small towns amongst the mountains, the ironwork is always most artistic in design. Brewing, too, was always a flourishing industry, an inhabitant of Regensburg being the first to brew wheaten-beer in Nüremberg.

Nor were the Regensbergers mere craftsmen, for the convents supplied the world with books and manuscripts. St. Emmeran possessed a unique treasure, the "*Codex Aureus*," a Book of the Gospels, which had been given by Charles the Bald to the Abbey of St. Denis. The leaves consist of purple parchment — the writing is in gold letters. The cover is composed of various ivory tablets joined together by rich, gold attachments ornamented with pearls and precious stones. It is now, with an Evangelium full of miniatures, and a Missal by one of Regensburg's sons, a miniature painter, Berthold Furtmeyr (1481), in the town library at Munich.

S. Beale.

THE GREAT EXHIBITION REVIEWED.[3]—VII.

AS AN EDUCATOR.

"Write the things which thou hast seen, and the things which are, and the things that shall be hereafter."

OF that which was but a few days ago a great reality, there remains now but an influence. The passing show, while it existed, amused and instructed us. But its greatest object was not thus accomplished. This enterprise of a great city, endorsed by a great nation and assisted by all the nations of the earth, would never have been undertaken, like many another great spectacle that has had its day, for momentary gratification or profit. It was what any member of the Board of Trade in that same city would call "a deal in futures." It was an expensive venture and brought no direct profit; but was worth all it cost to the city in which it was held, and the balance-sheet is even.

The nations of the earth met on this spot not only to compare the evidences of their material progress, in friendly emulation, but that they might hereafter cultivate the seeds of knowledge that were there to be gathered. The cost of the Exhibition has not been what the financial report gives us. The expenditures of 100,000 exhibitors would more than double that amount. All this treasure has been poured out to obtain tangible results. In the case of the merchant or manufacturer, these are the prospective profits of business: in that of nations and states, they are increased prosperity which must result from a diffusion of the knowledge of their recourses and advantages to the investor and settler; in that of the scientist or artist, the results must be the quickening of thought and the stimulation of investigation. Without these it must have been a failure.

Its influence for good must necessarily be most felt in our own country, which contributed most largely to it. Temporary financial depression will only postpone the benefits to our manufacturers and producers. It cannot extinguish them. This is not the case with Art. Depression in its market only gives time for more serious thought. The ultimate results of its influence will be the same.

The question not only is "Has the Exhibition reasonably fulfilled the expectation in this direction?" but, "Has it sowed the seed of progress?" In the quantity of exhibits in the Department of Fine Arts it has surpassed all previous experience; whether it has or not in quality we are unable to say. But this is certain, that so far as the American people are concerned, they have never before seen gathered together in one spot such a vast and varied collection of the representative productions of the arts of all nations. Nor have they before now seen such an extensive exhibit of the contemporaneous art of their own country, covering every department of the Fine Arts. For the first time in the history of international exhibitions this one has been rich in Architectural Art, both as to buildings themselves or representative buildings constructed of fictitious materials (admissible only as architectural works in such an exhibition), and designs and photographs of works executed elsewhere. Wherever a foreign country took part, its contribution was rich in exhibits of photographs of its best architecture. Decoration as applied to architecture, both in color and sculptured forms, was manifest everywhere both in our own and foreign exhibits. In painting, the largest collection ever known could be seen. Such countries as Denmark, Norway, Sweden, Poland and Russia contributed genuine surprises. Sculpture, as a special art-exhibit, was prominent, mainly from France and the United States. But the most valuable contribution was found in its application to the buildings and grounds. In this it was shown that America was in the lead, and now sculpture, which until recently has been a neglected art, except

[1] This tradition must be very legendary, as St. Oswald, King, was martyred in 642, more than two centuries earlier, and St. Oswald, Archbishop of York, who was a contemporary of the Emperor, Henry I, was martyred in 992.

[2] A short Saxon sword (*beste Sächsische Schwert*).

[3] Continued from No. 934, page 88.

so far as concerns isolated statues, is destined to experience a revival in consequence. Never before has sculpture been so effectively employed in architecture, not alone in simple groups but in consistent scenes covering entire buildings or in out-door groups of great magnitude.

The main groups of buildings have been an object-lesson in architecture, which now that photographs are being largely circulated is attracting attention all over the world. The Grand Court is so well known in its *ensemble* as to be almost a household word, and there are few school-children even who are not acquainted with its main features. It has done more to popularize architecture as an art than any other movement of this century. Why this is so it is not difficult to see. Whether it is an example of the best architecture of modern times is another question. As for the first statement, the explanation is easy: it is the first opportunity and successful effort to produce a complete architectural symposium on a larger scale that has ever been made in this country. That the result would not be a failure was evident. Any honest effort to produce it on the part of several masters of the art, working at once in rivalry and sympathy, and each not only trying to do his best but to do the best also for his neighbor, must have resulted in a success that none but a critic bent upon finding faults instead of beauties could gainsay. Has this ever before been attempted with real buildings? Does not all human experience show that architects for neighboring structures have never worked in harmony, but that each has striven to outdo his neighbor? And in this they have been encouraged and abetted by those who employed them. Here they were working for a common client and a common object. Variety has been obtained without sacrificing harmony; and this any one, however unskilled in the art, can appreciate.

It is not intended to be said, however, that the Grand Court is beyond criticism. It has been said in these papers that one of the buildings is *almost* above criticism, and this is still insisted upon. As an example of its style, in which it is consistent, it is not to be compared to any similar building in a different style. Thus the Administration Building is not to be put in comparison with the Taj at Agra, though both are similar in proportion and equally good as examples of the two styles. The Grand Court is an example of the best that has been done with a group of buildings designed in styles that are based on what we call Classic architecture. They are of many styles, yet harmonious, and the beauty of the whole effect comes from this variety. They are not an argument for the revival of Classic styles, but only show that the Classic styles are capable of a grand effect which might also be produced in other styles if used under the same circumstances.

There is a manifest impropriety in criticising these buildings individually. They are only intended to stand for a limited period of time, and if bad, will do no harm, for they will not stand for all time, as shining examples of badness against which all must be warned. It must be remembered that they were hurriedly produced and have not received that great care in the details that would have been exercised had they been built in imperishable marble or granite. On the contrary, they are only full-sized, rough-plaster models, suggesting what they might be if more carefully developed. Their faults may best die with them, but their influence for better architectural effects will live as a potent educator in future years. It will teach us that the beauty of our cities can be enhanced as much by careful consideration of the relation between building and building as by the superior excellence of individual but adjacent structures. It will hold up to everlasting shame the destruction of street perspectives by the erection of those grasping monopolies called "sky-scrapers," which steal the very light of heaven, to leave surrounding humanity in darkness. It will demonstrate how many opportunities have been wasted in the erection of our civic buildings by wealthy States and the general government. What would the City of Washington be to-day if the great public buildings, on which so many millions have been lavished, had been gathered around a grand court of harmonious proportion and design! It is easy now to imagine.

We have also learned from these examples of the value of appropriate sculpture as an essential in architectural effect. There is nothing new in this; but it has been brought home to us as an object-lesson that many will learn who did not before understand it. Whether it will result in the increased employment of sculptors of ability in such capacities remains to be seen. The times are not now propitious, but the lesson will take deep root. A slight element of color was also introduced in these buildings, and in appropriate places paintings were applied to the walls, domes and tympana of the arches, such as might have been employed in more lasting colors and mosaic on permanent structures. Here was another object-lesson, and though not new, it came home to us, and met with a popular appreciation.

The question has been repeatedly asked, that granting the superior excellence of the World's Fair architecture, what will be its influence upon the future of architecture in America? It will undoubtedly have an influence on the grouping of buildings, in which its greatest success has been attained, wherever circumstances are such that this is possible. It will evidently result in a greater popular appreciation of the latent ability of the architectural profession in this country. Notwithstanding the great sums that have apparently been lavished on the adornment of Jackson Park — but in fact used very sparingly to produce such grand effect — it must be kept in mind that it is only the cheapness of the material used in finishing merely representative buildings that has enabled the architects to give full vent to the exuberance of their designing powers. With these facilities they have only had the opportunity to show what they could do with permanent materials. This has been the great opportunity which never before existed, to bring the possibilities of architectural art within the view of great masses of people. In this, then, has architecture as an art been greatly benefitted.

It is not likely that these buildings will ever be reproduced or copied except by second-rate plagiarists, who will only succeed in caricaturing individual parts of them. There will never be a Grand Court again or any opportunity for one. Its great size is such that no State or Government could ever afford to produce it or anything like it on the same scale in permanent materials for any other purpose. The days of peonage in Assyria and Egypt are at an end, and labor is and will always be paid for in dollars and cents. Something like it might result only if the great buildings of Washington were all torn down and re-built in a similar group, or if the Capitol were removed to another city and at least $100,000,000 were expended on proper buildings.

We have also learned from this, how other undertakings involving the erection of a large number of buildings may best be managed. The building of the World's Fair has been a model of administrative management in which power has been delegated to the professional men employed as never before. By no other means could so much have been successfully accomplished in so short a time. It has been free from jealousies, dissensions and corruption from beginning to end. The experience of the administrative body and the corps of professionals will be a text-book for reference for many years to come. The World's Fair of 1893 is not dead except in its visible aspects. It will be a leading topic for discussion and comparison of opinion, until another one, more complete if possible, and more fruitful of good results shall have occurred. Its contents have been scattered; many of its art-works now adorn public museums and the homes of those who have been fortunate enough to obtain them. Its great buildings, now as impressive as ever — for the absence of masses of people, once so essential to their effectiveness, is consistent with their present mantle of ice and snow suggesting repose in the highest degree — will soon fade from sight; and then we will truly remember them as a beautiful dream. To all their past glories we now say "Farewell forever," but our hearts will still beat with lively hopes for "the things that shall be hereafter."

P. B. WIGHT.

[The end.]

THE ILLUSTRATIONS

[*Contributors of drawings are requested to send also plans and a full and adequate description of the buildings, including a statement of cost.*]

MAIN ENTRANCE OF THE CONGREGATIONAL CHURCH, PROVIDENCE, R. I. MESSRS. CARRÈRE & HASTINGS, ARCHITECTS, NEW YORK, N. Y.

[Heliochrome, issued with the International and Imperial Editions only.]

DESIGN FOR TARRANT (TEX.) COUNTY COURT-HOUSE. MR. J. R. GORDON, ARCHITECT, SAN ANTONIO, TEX.

PARENTAL SCHOOL FOR BOYS, WEST ROXBURY DISTRICT, BOSTON, MASS. MR. E. M. WHEELWRIGHT, CITY ARCHITECT, BOSTON, MASS.

GRAMMAR SCHOOL, DORCHESTER DISTRICT, BOSTON, MASS. MR. E. M. WHEELWRIGHT, CITY ARCHITECT, BOSTON, MASS.

HOUSE FOR GEORGE L. BEECHER, ESQ., DETROIT, MICHIGAN. MESSRS. JOHN SCOTT & CO., ARCHITECTS, DETROIT, MICHIGAN.

NEW MEETING-HOUSE FOR THE HAVERFORD (PA.) MEETING. MESSRS. BAILY & TRUSCOTT, ARCHITECTS, PHILADELPHIA, PA.

[Additional Illustrations in the International Edition.]

THE COLUMBUS ARCH IN THE PERISTYLE, WORLD'S COLUMBIAN EXHIBITION, JACKSON PARK, CHICAGO, ILL. MR. CHARLES B. ATWOOD, ARCHITECT.

[Gelatine Print.]

FOUNTAIN ATTRIBUTED TO DONATELLO, VILLA REALE, FLORENCE, ITALY.

[Copper-plate Etching.]

THIS white marble fountain detaches itself against the background of the grotto upon a wall of which is cut a bas-relief representing a group of animals from Noah's Ark.

THE SALON, ALTHORP PARK, NORTHAMPTON, ENG.

NEW STABLING, GROVE HOUSE, HARROGATE, ENG. MR. T. BUTLER WILSON, ARCHITECT.

These buildings are placed about 200 yards northeast of the house. The buildings have been designed in the English Renaissance style, and are placed due north and south. They are erected of local sandstone, with tooled dressings to doors and windows. The roofs are covered with Peake's red roofing tiles, and half-timber work, fitted in with rough casting, has been introduced here and there with good effect. The approach from the house is by a broad carriage-drive to the front of the stables, where is situated a fore-court, surrounded by a low stone wall, with quaint posts finished with spherical balls. The entrance archway (a relic of the Dragon Hotel — which for some time was the home of Mr. Frith, R. A.), forming a central feature, has over it a clock-chamber, belfry and clock-tower rising to a height of 50 feet. On the right of the tower is the coachman's house, while to the left are placed grooms' waiting-room and harness-room. Passing through the arch under the tower — which is filled by a pair of handsome wrought-iron gates, while the inner arch is screened by heavy oak doors — we reach a glass-covered court, from which entrance is obtained to the principal stable, coach-house, Turkish-bath, grooms' waiting-room, harness-room, coachman's house, and, in fact, every portion of the building without passing into the open. Beyond this we have an open court-yard, surrounded by a glass-covered causeway, with concrete floor falling to a central water-waste. The range of stabling on the right consists of four loose-boxes and eight stalls. The passageway behind the stalls gives a width of 9 feet, and is crossed from every stall by a protection bar. The floor is paved with patent buff bricks and the walls have a dado of specially-made glazed bricks, also of buff color, above which they are finished in hard stucco. The stables, which are lit on both sides by patent casement windows, rise to a height of 12 feet. The ceiling is formed of planks, 9 inches by 4 inches, on 12-inch by 12-inch pitch-pine beams, supported by moulded stone corbels. The hay and corn chests are placed in arched recesses, and are fed from hay and corn chambers above. Over each stall the name of the horse is placed in a neat iron frame. Immediately beyond the stable, and in conjunction with it, are two stud boxes, 19 feet by 12 feet. Returning to the court-yard on the opposite side, we have the principal coach-house, giving accommodation for twelve carriages, the openings to which are fitted with revolving shutters. To the north of the court-yard, completing the quadrangle, is placed another coach-house, where there is accommodation for six carriages. In the angle between these two buildings is situated the hospital, which, by this means, is completely separated from the other stabling. This building, 18 feet by 18 feet, consists of loose-box and two stalls, and is lined from floor to ceiling in glazed brick. The Turkish-bath and wash-box, 19 feet by 11 feet, is approached directly from the glass-covered court, the heat for which is generated by a hot-air apparatus in the basement, and adjoining is bran-mash pan.

Over the principal stable is placed a hay-chamber, about 100 feet by 19 feet, while over the stud box are placed corn-chambers and work-rooms. Passing up a stone staircase from the opposite side of the court-yard there are two grooms' bedrooms and the owner's private room, from which, by a short staircase, the clock-chamber is approached. Here is placed the machinery of the clock, as also that of the carillon. By another flight the bell-chamber is reached, which again contains the connecting mechanism from machine to bells. Two doors open, north and south, to open balconies; in the front are a peal of nine bells. Directly over the chamber is the clock-turret. The clock chimes the Westminster chimes of the hour, quarter, and half; and at twelve, three, six and nine, tunes are played on the carillon. It may be of interest to add that these buildings give accommodation for seventeen horses and eighteen carriages, besides the detail above mentioned, and cover a space of over 1,600 super yards. They have been erected at a cost of over £6,000.

ZWINGER PALACE, DRESDEN, AFTER A DRAWING BY SAMUEL PROUT.

[Note: — Owing to misinformation which led us to attribute to Mr. C. B. Atwood instead of Mr. S. S. Beman the designing of the Merchant Tailors' Building, which was published in our issue for November 4, last, we have reprinted the plate and now send it again to our subscribers with the request that they substitute it for the earlier plate. — Eds.]

NOTES AND CLIPPINGS

A Lath-and-Plaster Church. — The little hamlet of Hazeleigh, in Essex, possesses as curious a little church as can be found anywhere in the kingdom. It is built of lath and plaster, which strike one as being singularly mean building-materials for a church. However, whatever one may say with regard to meanness, the charge of inconsistency certainly cannot be brought against this little church, for everything about it is mean and dirty, from the diminutive bell-turret, which alone distinguishes it from the sheds of a neighboring farm, to the sunken floor. The mean and dirty wooden doors and windows are fitted in leprous-looking walls, none of which point directly heavenward. The vestry which is little larger than a cupboard, contains a couple of dusty boxes and an odd collection of rakes and spades in one corner. The name of the chancel is given to a roughly railed-off strip at the east end of this shed-like edifice. The pews, which are not as other pews, but are like little, square sheep-pens, in which four people sit, two on each side, face to face after the manner of a railway compartment, have of course fallen with the floor, which slopes away in all directions. Viewed from either end, the body of the church presents a decidedly billowy aspect, as all the pens are pitched at a different angle. There are about ten of these pens in all, and they are of a dirty-gray color, which was perhaps once white. A few ancient vellum-bound hymn-books and Bibles lie on the little ledges. The pulpit consists of a square, mouldy, old box with a shelf placed on another box. This serves for reading-desk as well as pulpit, and over it projects a liliputian sounding-board, all begrimed and dusty. An old man who had actually been to a service in this queerest of all churches was politely requested to step into one of the pens, but declined, preferring a stool outside as being less dusty. "The service was a dreary one," continued the old fellow, "but I managed to while away the time in observing the movements of the moths, bats and butterflies which constantly flitted about." Really interesting features, though, are the sixteenth-century hour-glass stand and the register, which dates from 1584, and contains the fully emblazoned arms of "Giles Aleyne, gentilemen," whilom resident of the hall when the Essex Alleynes, flourished at Hazeleigh. Many will be interested to know that one of the Alleynes, Edward by name, was the famous actor and "master of the King's bears," who, on his retirement from the stage in 1602, founded the College of God's Gift at Dulwich. — *London Daily Graphic.*

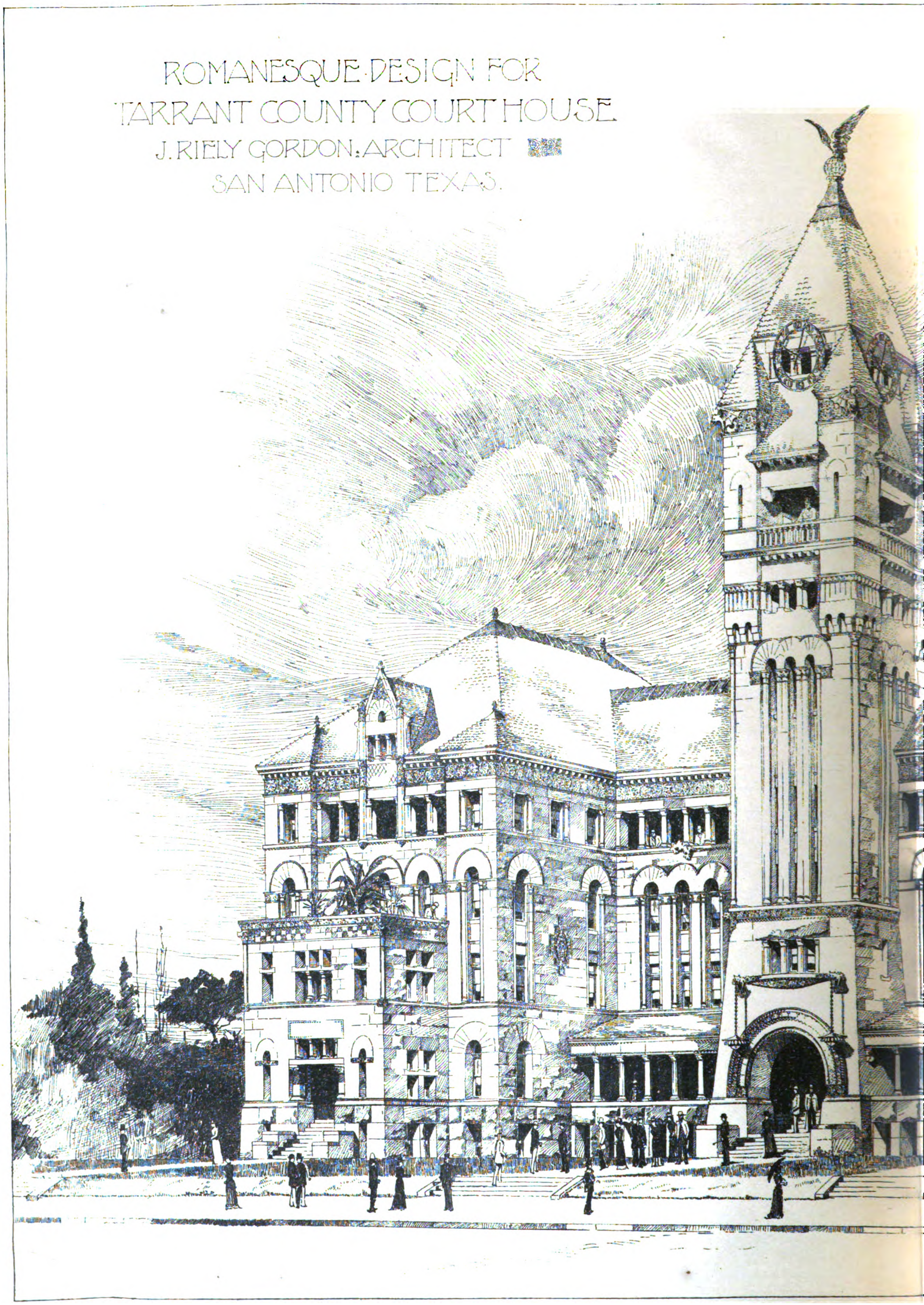
Copying Sculpture by Machinery. — Amateur and professional draughtsmen are familiar with the instrument called a "pantagraph," by means of which it is possible to reproduce, on a larger or smaller scale, any drawing which a person has before him. By means of a simple lattice-work, pinned to the table, every motion made with a pencil point inserted in one part of the frame is imitated with mathematical exactness by another pencil. Something of the same sort, but on a more elaborate scale, has now been applied to sculpture. A French maker of statues for churches, M. Delin, has invented apparatus by means of which he can shape a block of stone into a rough copy of a finished figure. He has the two marbles placed upright on revolving horizontal tables, which are so connected as to rotate simultaneously and with very precise agreement. A sculpturing tool, operated by electricity, is suspended from the ceiling before the block to be cut, and fixed in such a way that it advances and recedes in unison with a tracer, in the workman's hand, held before the model. The tables on which the figures stand may be raised or lowered together at the operator's will, and thus it is possible to reach every portion of the mass under the graver. The machine is intended to perform only the rougher work of the studio, and not to dispense entirely with finished touches by the hand of a true artist. M. Delin's invention is adapted to enlarging or reducing, as well as to copying. — *N. Y. Tribune.*

Is a Porch a Building? — The question as to whether a porch is a building was decided in the negative yesterday in an opinion handed down in the equity proceedings of the Ogontz Land and Improvement Company *vs.* Amos Johnson. The plaintiff company has developed a building tract in Abington Township, suburban to Philadelphia, and sold a lot to Johnson, the deed containing the restriction that "all buildings upon said lot shall be erected not less than fifteen feet back from the fence line." In erecting a dwelling Johnson complied with this restriction, but subsequently began to build a porch in front. The company, taking the view that a porch is a building, asked for an injunction restraining him from maintaining the structure. The court held that whether a porch or piazza attached to a dwelling is a building or merely a constituent part of it depends upon the manner of its construction. In the present case the porch is an open one, and were it to be regarded as a building within the meaning of the restrictions imposed in the deed, the court holds, objection might be maintained to steps or eaves extending beyond the limit of fifteen feet, citing several cases. Judge Weand assumed that in whatever sense piazza is used it does not convey the meaning of building. The motion for an injunction was therefore over-ruled. — *Norristown Despatch to Philadelphia Ledger, December 6.*

The new Roofing on the Indiana State-house. — A new roof recently placed on the Indiana State-house, Indianapolis, weighs some 900,000 pounds less than the one it has replaced. The old roof was of slate, of which there were about 60,000 pieces, each weighing 16¼ pounds, or 975,000 pounds in all. The new roof, which is of copper, weighs but 75,000 pounds. The placing of a new roof was necessary on account of leaks in winter from snows melted by steam-pipes. — *Metal Worker.*

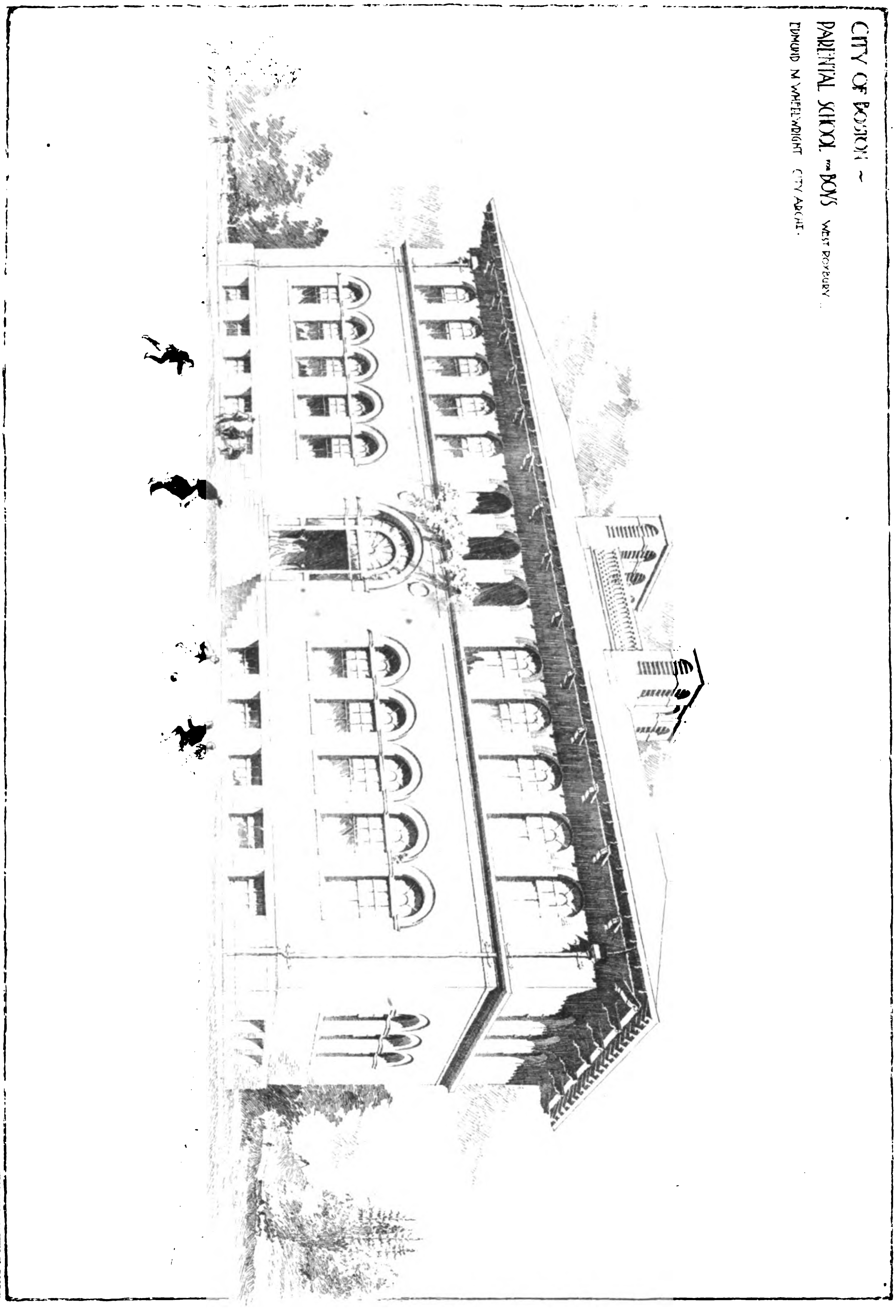
The Cost of the English Coal-strike. — Statistics of the great strike of the English coal-miners, recently ended, showed that during the sixteen weeks of the strike the normal output of 63,000,000 tons dropped to 39,000,000. Ordinarily 11,000,000 tons are exported and 49,000,000 tons are consumed in England in the period mentioned, but during the strike only 8,750,000 tons were exported and 27,250,000 tons consumed. The estimated loss to mine-owners, iron-masters, railroads and others was £13,255,615. Consumers paid in increased prices £1,767,000. Miners, iron-workers and other artisans lost £18,208,000. The total general loss is placed at £33,232,215. The workers rendered idle numbered 1,003,250. — *N. Y. Evening Post.*

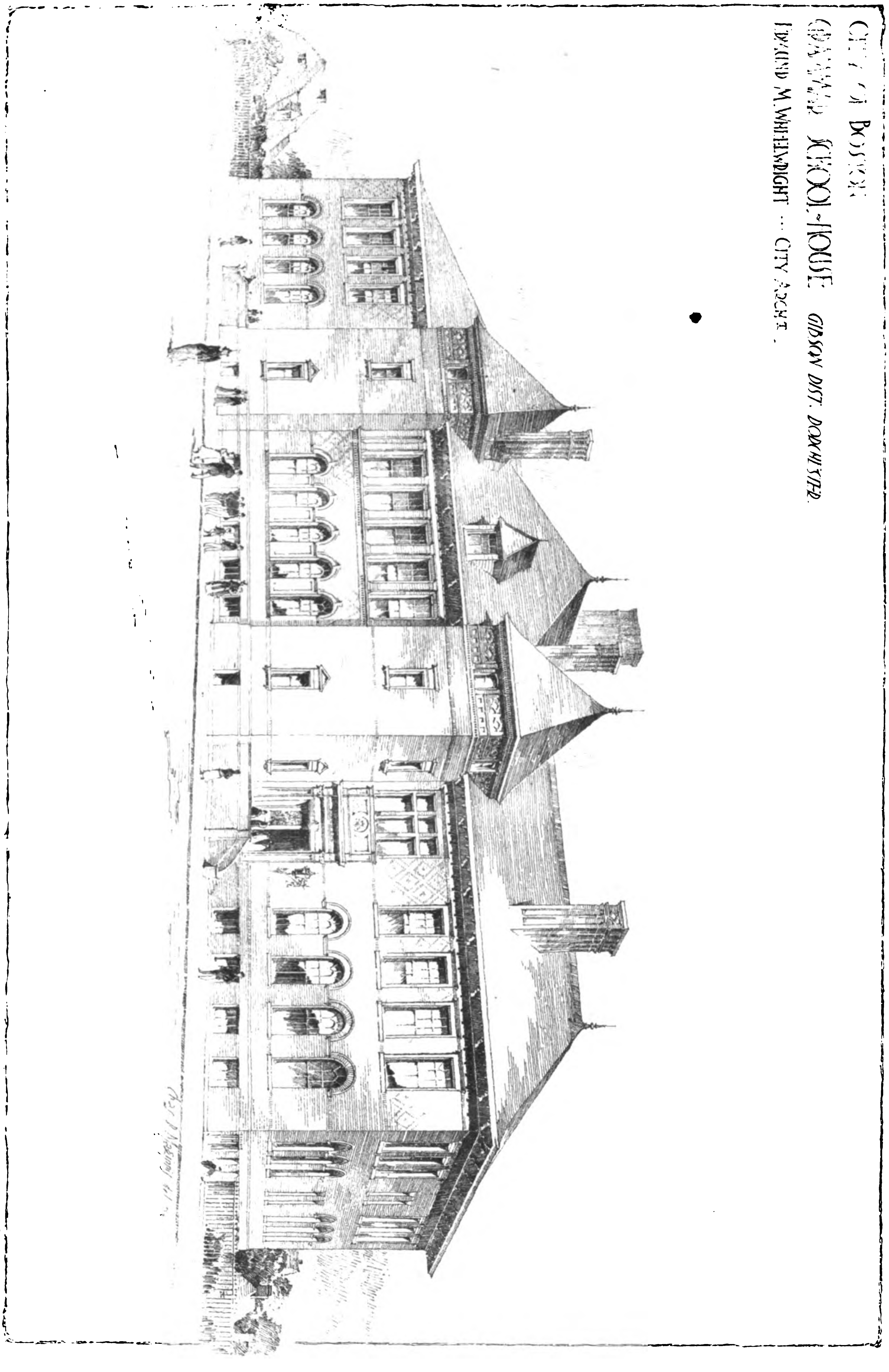
S. J. Parkhill & Co., Printers, Boston, U. S. A.


ROMANESQUE·DESIGN FOR
TARRANT COUNTY COURT HOUSE
J. RIELY GORDON: ARCHITECT
SAN ANTONIO TEXAS.

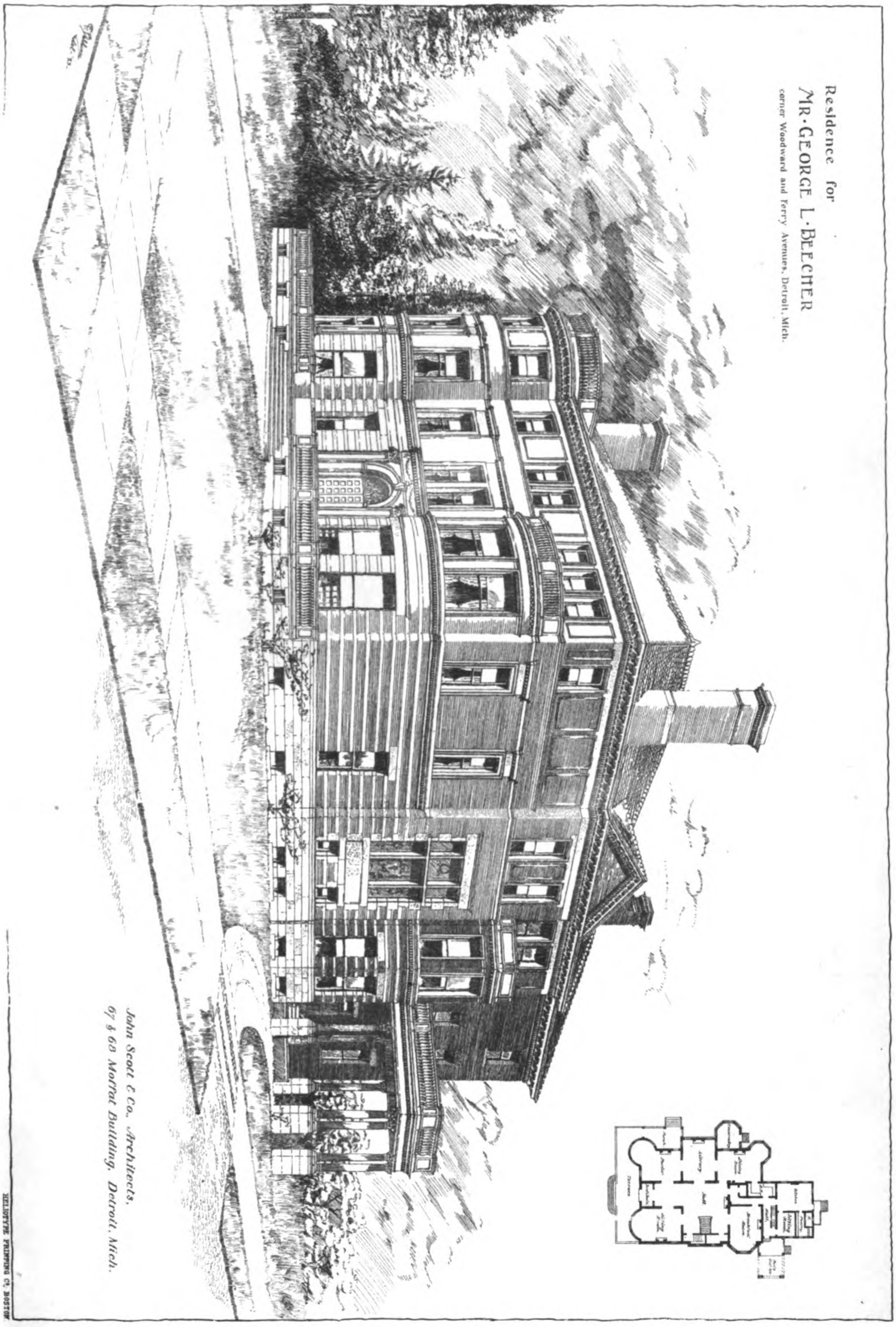
Building News. Dec. 30. 1893.

Heliotype Printing Co. Boston


CITY OF BOSTON ~
PARENTAL SCHOOL FOR BOYS WEST ROXBURY.
EDMUND M WHEELWRIGHT CITY ARCHT.

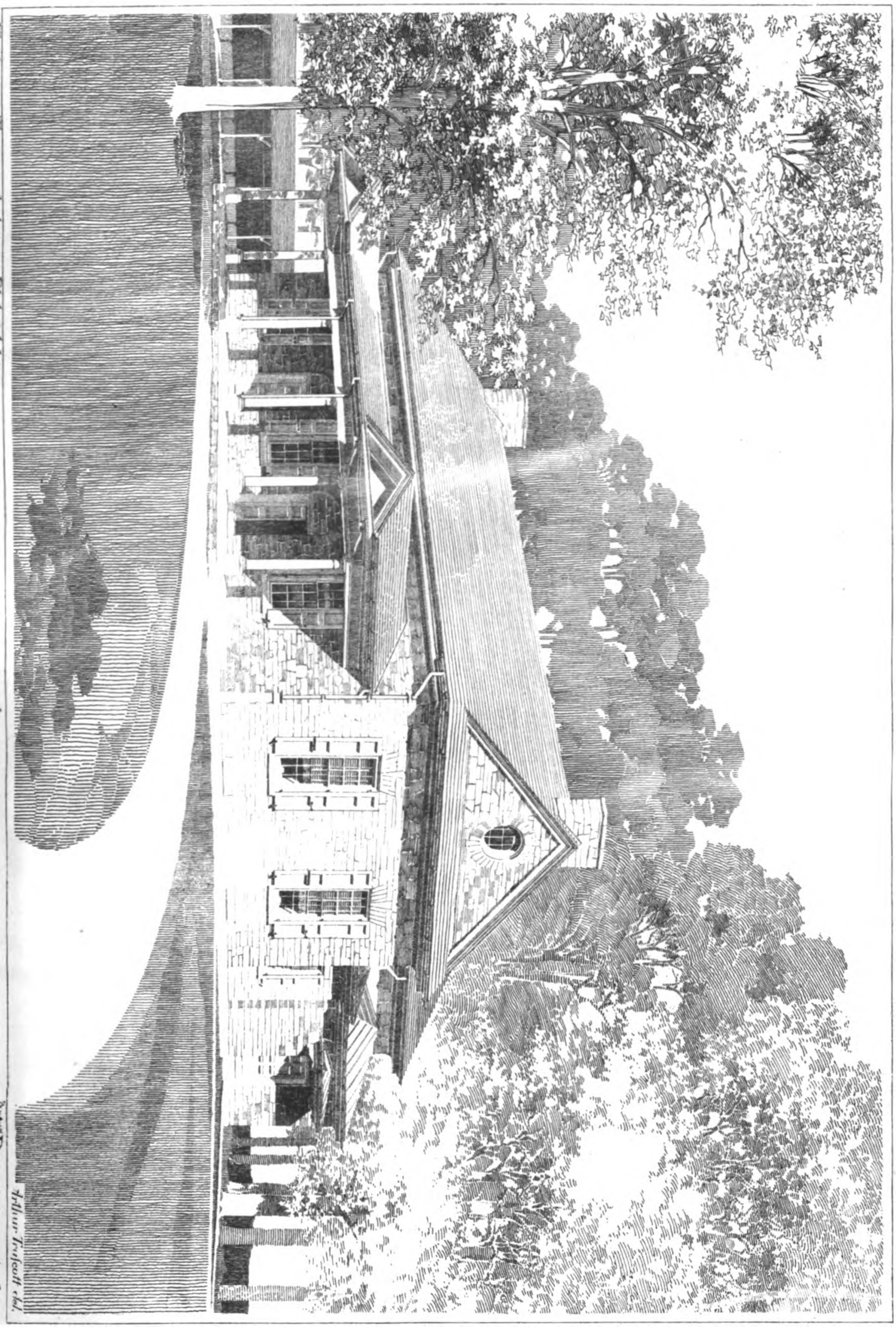


School-House Gibson Dist. Dorchester.
M. Wheelwright ... City Archt.



Residence for
MR·GEORGE L·BEECHER
corner Woodward and Ferry Avenues, Detroit, Mich.

John Scott & Co. Architects,
67 & 68 Moffat Building, Detroit, Mich.



Baily and Truscott, Architects, Philadelphia.

A Drawing made for a

The American Architect and Building News

ADVERTISERS' TRADE SUPPLEMENT.

No. 133. SATURDAY, JULY 1, 1893. VOLUME XLI. No. 914.

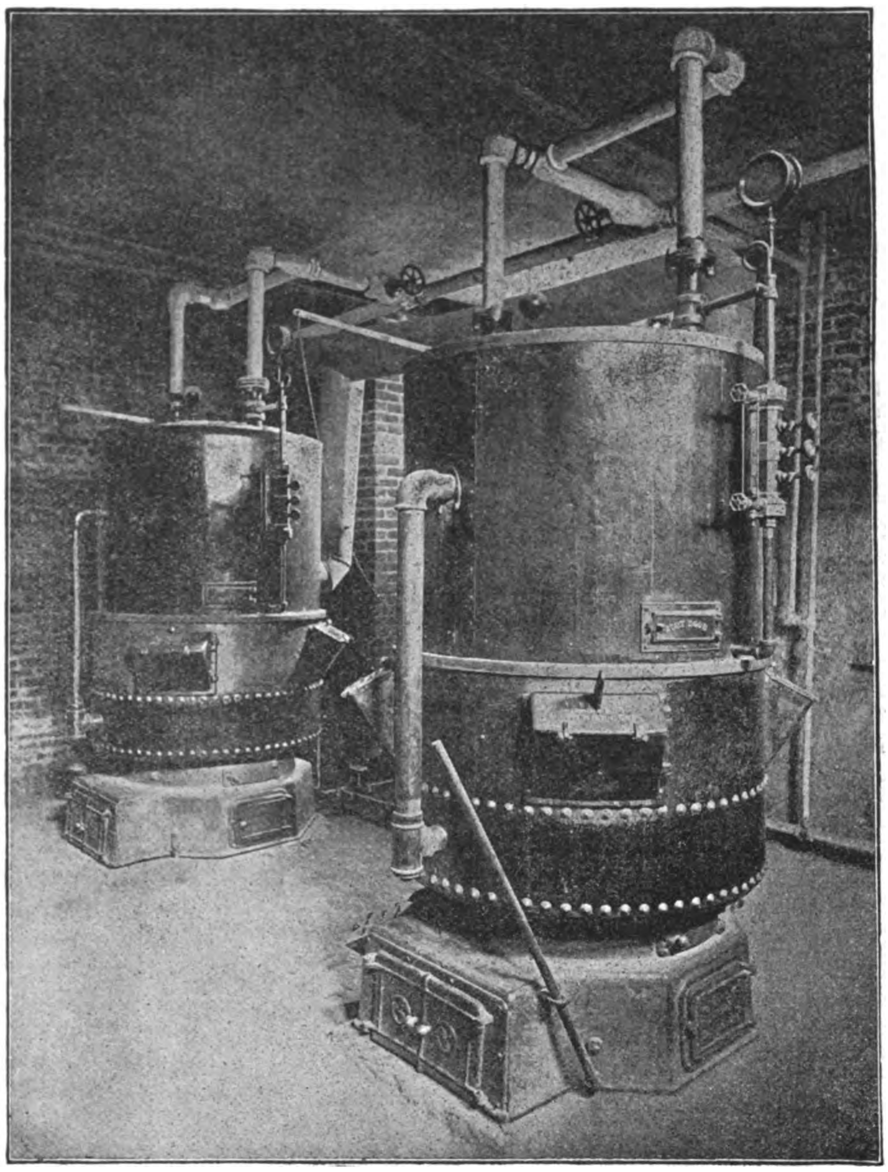
SONNET BY THE ADVERTISING SOLICITOR.

(After Keats.)

Much have I hustled round for ads,
And many goodly cities have I seen,
Round many stores and factories have I been
Where ads came easy, for 'twas quite their fad,
And never they complained that trade was bad.
But there are places I have learned to shun
Where they are slow and close, and hold their little hoard with miser grip,
And tell the advertising man to skip ;
And carelessly expose their gun :
In such society I find no fun.
Yet do I get a sweet and strange revenge,
When by and by there comes a sheriff to their stores
Armed with a writ, and locks their doors,
And they are swallowed in the sea of Bankruptcy.

GORTON STEAM BOILERS.

WHERE buildings of considerable size are to be heated it is often found expedient, for the best results, to employ two or more boilers so connected that they may be run either separately or together, thus regulating the supply of heat according to the demand for it. An efficient heating service is thus secured and maintained at the minimum expense. The illustration presented shows an installation of this character of two No. 5 Gorton Patent Side-Feed Steel Boilers which are used for heating the large City-hall Building at Amherst, Mass. This is a very handsome brick structure erected in 1891. It is two stories in height, 110 feet long by 60 feet wide. On the first floor there are four large office-rooms, selectmen's room, town-clerk's room, assessor's room, library, police-court and a large corridor running nearly the entire length of the building. The second floor is mostly occupied with a large hall. It has a large stage at one end with stage dressing-rooms, etc., and seating accommodations for 700 people. When this hall is not in use one boiler only is used in heating the building.



The heating-apparatus was erected by Mr. William W. Hunt a prominent steam-heating engineer of Amherst. It is constructed on the double pipe "Gravity Return" plan and all pipes erected are of ample size to insure the active delivery of dry steam to the radiators and an easy flow of the water of condensation back to the boilers. The main steam-pipe from the boilers is $3\frac{1}{2}$ inches and is gradually reduced to $2\frac{1}{4}$ inches, 2 inches and $1\frac{1}{2}$ inches. It is suspended from the ceiling of the cellar by adjustable hangers placed about eight feet apart and extending upward therefrom the requisite number of vertical pipes to supply the heating-surface throughout the building with steam. It is also provided with the necessary vertical drip-pipes from "riser" pipes connected into a main return-pipe, and discharging into the boilers. The first floor is heated by seventeen radiators which in the aggregate contain 796 square feet of radiating-surface and the second by sixteen radiators which contain an aggregate amount of 1,100 square feet, making a total of 1,896 square feet of radiating surface in thirty-three radiators heated by two No. 5 Gorton boilers.

The manner of connecting the two boilers as shown in the illustration is very simply and easily accomplished. These boilers have been in use for the past two winters, one of which will long be remembered for the severity and length of its season. During this period the service rendered has been all that could be desired, the boilers giving no trouble whatsoever, and proving that a steam-heating plant of this kind when well installed is not only a desirable but, as well, a profitable way of heating large buildings.

GORTON & LIDGERWOOD CO.,
96 LIBERTY ST.,
NEW YORK, N. Y.

SOMETHING NEW.

A NEW departure in house building has recently been made in several localities, notably in Pittsburgh, Pa. It may not be so much of a new idea, as the revival of old methods, except that metal lath is substituted where formerly wood was used. This method, briefly described, is to construct a frame of wood studding, such as is used when a weather-boarded house is the design. The studding are sheathed with rough boards, usually placed diagonally. Over this sheathing a layer of building paper, preferably waterproof, is fastened for the double purpose of covering cracks and joints in the lumber, and preventing the mortar adhering to the sheathing, thus avoiding the risk of cracking

the cement in the event of shrinking of the wood.

The Expanded Metal Lath used for this construction furnishes ample key when fasened to a plain surface to prevent any falling, but, for the purpose of securing a heavier body of cement, thin furring strips (1 in. x 1¼ in., spaced 12 in.) are placed in a vertical position over the paper. The metal lath is securely fastened to this furring, and the mortar applied with any finish the architect or builder may select. The style of the finish of houses at Pittsburgh represents rock-faced-stone, range-work, smooth rubbed work, and rough-cast work. Of course it can be readily seen that, with the plastic cement, in the hands of a skilful mechanic, the question of style is a simple one and can be made to suit any variety of tastes of builders. Houses similar to these have been erected in Texas, Illinois, and New York. They are very substantial, neat, and, compared with stone — which in some forms they represent so exactly that, at a short distance, experts cannot detect the difference — they are cheap, costing about one-third as much as solid stone. In some localities it is claimed the cost will not exceed a painted weather-boarded house, if the plainer style of finish is used. These structures are very tight, warm and dry. Cement being impervious to water, the dampness so common in brick and stone buildings is not present.

Much of the exterior work at the Columbian Exposition which is now attracting so much attention and admiration and viewed as the work of the sculptor or mason, is nothing more than the skill of the plasterer in applying mortar, cement or staff to Expanded Metal Lath and giving all the effect of solid stone. The Statuary, the Model Gunboat, Office Building, Lining for conduit for miles of underground cables, etc., are constructed in this manner.

For inside plastering this lath has become a staple article, at least for the better class of work in the larger cities. Most of the builders and architects are familiar with it and like it because of its fidelity, if this word may be applied to an inanimate thing like steel. It does not disappoint them in showing cracks in walls or falling ceilings or furnish fuel for flames on the least provocation — nothing has been found so reliable.

The Expanded Metal Lath used in this work as a foundation on which to lay the cement is a unique article, manufactured by the Central Expanded Metal Co., Pittsburgh, Pa. A sheet of solid steel is slashed in parallel lines at a distance of about ¼ inch apart, and then stretched. In the stretching process the strands made by the slashing are turned to nearly a right angle with the face of the plate, thus making the sheet very rigid, and securing a base for the most secure keying of the mortar possible. In this form when mortar once hardens, it cannot separate from it. This secures walls that cannot crack, fall or burn.

A Catalogue giving full particulars and showing illustrations of houses erected in this way, that have passed through several severe winters without in any way impairing the walls, will be sent by the

CENTRAL EXPANDED METAL COMPANY,
521 Wood Street, Pittsburgh, Pa.

THE FLYING DUTCHMAN.

What the connection is between a plough and a flying Dutchman we do not pretend to know, but we will hazard the guess that, inasmuch as one ploughs the sea, without ever seeming to get out of order or having to go into the dry dock for repairs, it is intended to suggest that the other instrument may successfully tear up the soil through succeeding ages without ever having to be either repaired or sharpened. Whether or not this guess hits the mark, the fact is that the Moline Plow Company, of Moline, Ill., has selected the Flying Dutchman as its trade-mark, and, after the manner of the nimble-witted advertiser of the day, has not only done this, but has chosen to burlesque its namesake, and represents the ghostly original in the guise of the very substantial winged figure which the annexed cut represents. This figure has been modelled, we suppose, by one of the sculptors in the employ of W. H. Mullins, of Salem, O., who, so far as we know, is unknown, but evidently deserves a place somewhere on the ladder of fame, as he has discharged his task with marked success. Mr. Mullins has taken advantage of the opportunity, and exhibits as a portion of his contribution to the gaieties of the World's Fair a reproduction of this figure in beaten copper, which measures eighteen feet in height, and we won't say how much in girth, measured about the lower button of the waistcoat. It seems not unlikely that, as a business venture, he will derive more profit through the exhibition of this figure, which will certainly be remembered by all who see it, than if he should merely state that the figure of Diana and sundry angelic and cherubic figures on the Machinery Building had been produced at his works.

Since writing the foregoing paragraph we have encountered in *Metal* the real history of the adoption of this trademark. The secretary of this company, gives the following facts: "In relation to the Trade Mark we have this to say concerning its conception and adaptation to our uses. Some years ago we conceived the idea of a new form of plow, which entirely revolutionized the riding-plows of the day. So great was the rout of the two-wheeled sulky plows that we conceived the idea of naming our plow after the phantom ship, 'The Flying Dutchman,' the sight of which, you will remember, created a panic in the hearts of all of the slow-going sailors who were unfortunate enough to meet it. From the name 'Flying Dutchman' we evolved the present trade mark. In explanation of the poise, we first printed head lines parodying the Bartholdi Statue, from which in part the idea is conceived, to wit: 'We take the Liberty of Enlightening the World of the merits of the celebrated Flying Dutchman Sulky Plow,' being a play on the words, 'Liberty Enlightening the World.' The trade mark has been so taken that we have enlarged upon it and continued to use it generally." This history is interesting as showing the evolution of an idea which began with the famous legendary ship and ends with a gigantic statue so grotesque as to be in itself much more effective for advertising purposes than the original Flying Dutchman could possibly have been.

REMOVAL.

THE J. H. & D. Lake Co., manufacturers of all kinds of Friction Clutch Pulleys, having outgrown their old quarters at Hornellsville, N. Y., have recently completed and removed to their handsome new offices and foundry at Massillon, O., where with enlarged facilities they were prepared to meet the growing demand of their business.

An interesting feature regarding the rapid growth of the Lake Co. is the fact that it came almost exclusively from advertising, for with the exception of a limited amount of travelling, they have had no representive out on the road, except their card in the various class journals.

A NEW SANITARY CATALOGUE.

THE Haines, Jones & Cadbury Company, of Philadelphia, have just issued a new Sanitary Catalogue. The volume is an exceedingly handsome one, bound in cloth, 13½" x 10½", and contains 216 pages of the very best enamelled paper, on which are illustrated the many sanitary specialties manufactured and imported by this old established firm.

The reader is confronted on opening the catalogue by a most *recherché* interior view, following which is a preface in which it is pointed out that the chief aim of the present age of progress is to combine simplicity with the necessary utility of the sanitary fixtures; together with a beauty of design and an artistic exterior which will fulfil all the requirements as regards the laws of sanitation, and at the same time meet the most fastidious desires of high class taste and refinement.

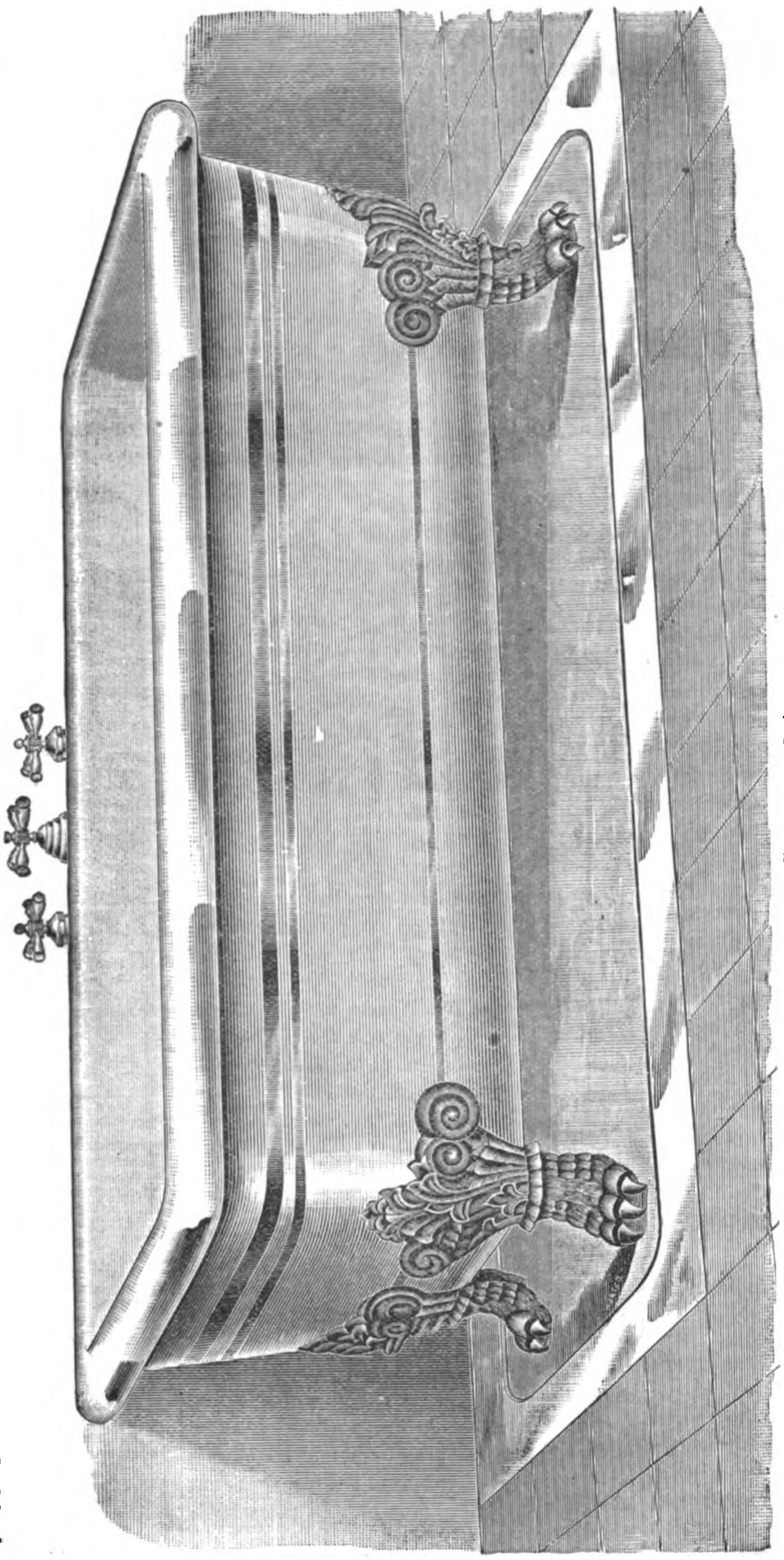
The engravings following give a most complete list and description of porcelain-lined baths, both with wood rim and roll rim. The latter showing the outside enamelled in ivory and gold bands.

Special attention is given to the "Regal" Porcelain Roll Rim Baths, which are imported by "The Haines, Jones & Cadbury Company" and made especially for them in Great Britain. These baths are illustrated in the French and Roman patterns.

Following the "Regal" Porcelain Baths comes a full, complete set of over a hundred illustrations and descriptions of the different closet outfits manufactured by them, first and foremost of which is the "Hajoca" syphon-jet closet. A most complete description of showers and needle baths, water-closet seats and cisterns, lavatory brackets and legs, "Regal" porcelain kitchen sink, marble lavatories with the "Electric" and "Perfection" wastes, and slate and marble urinal stalls; and in fact a complete catalogue of all sanitary fixtures.

Throughout the book may be noticed several very artistic and beautiful colored plates of bath-tubs and water-closets, which add greatly to the appearance of the book. In fact, this catalogue far surpasses anything ever before gotten up by this firm, and is the equal if not the superior of any other at present before the trade. The catalogue should be in the hands of every plumber, and will be sent on application.

HAINES, JONES & CADBURY CO.,
PHILADELPHIA, PA.



The "Regal" Bath.

LANE'S PATENT STEEL PARLOR DOOR-HANGER.

THE Lane parlor door-hanger differs from others in several important respects. Among the chief points of superiority may be noted: first, that it is made throughout of steel instead of cast-iron, thus avoiding all danger or probability of breakage. How much annoyance and expense may be caused by an inaccessibly defective hanger or track in a furnished house, those who have had such experience need not be told. The wheels run on a single steel track. This track is not liable to such derangement as swelling or shrinking, or springing out of shape from furnace heat or humid air, but is thoroughly durable. The track being secured to one partition instead of two, as in the case of the common double wood tracks, is not subject to derangement from unequal settling of said partitions. The wheels of this hanger are made with a centre of the very best sole-leather, the edge of which forms the rolling surface. This leather is a solid disc extending quite to the axle, and is firmly pressed and held between steel discs by means of steel nuts on a steel axle. The use of the leather in the wheel causes it to run with the noiselessness of a bicycle and the wear on the leather being a rolling one only, renders it practically indestructible. The extreme simplicity of this hanger and track makes its erection easy, and cost for labor very light; some carpenters say taking but a quarter of the time required for other kinds, and no cutting of doors; so that, if at a greater first cost, the expense when erected will generally be found much less than where the cheap grades of hangers are used. We accomplish the avoidance of door warping by using one track only, the hanger suspended directly beneath it, and the middle of the door fastened to the hanger, so that the whole weight of the door is suspended plumb from the track, tending to keep it straight and true. The principle is well-known to the horseman as applied to his whip. The axle of the hanger-wheel does not run in a solid box, but is of the anti-friction type, and most people now recognize the superiority of anti-friction hangers over the old style noisy hard-running kind with fixed bearings. Each hanger may be adjusted independently of the other by the use of a screw-driver and without derangement of any part. The stop we make of steel, and place it at the rear of the door and midway; the door thus will strike square as it should do. We make the stop on the gravity principle, and if either door should need to be run out into the passageway, a knife blade may be inserted at the side and rear edge of the door, turning the stop one-quarter way around, when the door will be free to pass out.

LANE BROTHERS,
POUGHKEEPSIE, N. Y.

CHROME STEEL WORKS' FAIR EXHIBIT.

AMONG the various exhibits in the Mines and Mining Building at the great World's Columbian Exposition holding forth at Chicago, there is none likely to attract more attention than the unique exhibit made by the Chrome Steel Works of Brooklyn, N. Y., located in the New England Section, Column 14 S of that building.

This concern manufactures the well-known Chrome Steel castings, which are specially adapted for use where extra durability, strength and toughness are required, among which are such castings as battery-shoes and dies, cams, tappets, etc., for stamp-mills, spinning and stamping dies used by tin-ware manufacturers, gears, wheels, pinions, hammer dies, etc., and also their famous combination plates of five-ply welded Chrome Steel and iron used in the construction of burglar-proof safes, vaults and prison cells.

While most exhibitors display new goods in order to catch the eye and please the fancy of the visitor, the Chrome Steel Works has departed from this prevailing order of things, and has made the leading feature of its exhibit *worn-out castings* (as enumerated above), which have been contributed by mines throughout almost every mining district in the United States and Mexico, each piece of which is labelled with a report from the mine superintendent under whose management they were individually used, stating length of service, quality and quantity of ore crushed, and specimens of same, beside other information of value and interest to mining men. These castings show remarkable evenness in wear and longevity before being finally discarded. In addition to the *worn-out castings*, the Chrome Steel Works also has on display samples of their famous combination welded Chrome Steel and iron five-ply plate, which for years past has been and is now being used in the construction of the safes and vaults of the largest financial institutions throughout the country.

Every one interested in the economic use of castings and in the construction of burglar-proof work should make it a point to visit the Chrome Steel Works' exhibit. Mr. John B. Power is in charge, and will be glad at all times to receive visitors and explain the merits of Chrome Steel for the special purposes to which it is best adapted.

CHROME STEEL WORKS,
BROOKLYN, N. Y.

NOTICE REGARDING TAPPING OF HOT WATER-RADIATORS.

THERE has been such variety of preference among our customers as to the method of connecting radiators, and so much confusion and delay have resulted, that we will hereafter send out our radiators tapped for flow-pipe at top as usual, with two return openings tapped at bottom of same end, and one return opening tapped at bottom of opposite end.

In this way connections can be made at either end as may be desired, and unused openings closed with countersunk plugs.

We feel sure this will obviate the difficulty pertaining to the former method of trying to adapt shipments to such a variety of requirements, and will prove a convenience to the fitter.

GURNEY HOT WATER HEATER CO.,
BOSTON.

NOTES.

THE readiness with which the modern business man in this country adapts himself to changing conditions of demand, and consequently changes the very nature of his business and the character of the stock he requires is somewhat strikingly illustrated in the catalogue of W. R. Ostrander & Co., who have just removed their office to No. 204 Fulton St., New York, to a position nearly opposite the one long occupied by them. A few years ago the catalogue of the firm consisted, so far as illustrations are concerned, only of a few simple cuts of speaking-tube mouthpieces, a simple arrangement of annunciator, and a variety of bell-cranks and bells. Now, however, their catalogue of 130 pages contains three or four cuts upon each page, whose varied nature shows how the business of this firm has changed and expanded. Here in addition to improved forms of aunuuciator, speaking-tube and call-bell, are shown a great variety of hardware fixtures which are associated with the saving of valuable time through the use of oral, electric, tensional and pneumatic methods of calling and signalling. In addition to these appliances belonging to the natural expansion of their original business, this firm now deals in burglar-alarm apparatus, time-clocks, electric-fan motors, electric gas-lighting apparatus, door letter-boxes, etc.

A MEETING of the Board of Education in Detroit, Mich., was held on the evening of June 15th, to consider the report submitted by Mr. W. J. Baldwin, President of the American Society of Civil Engineers, upon the plans and specifications submitted by numerous competitors, for the heating and ventilation of the new Central High-School building.

Mr. Baldwin recommended to the Board the acceptance of the proposition submitted by the Huyett & Smith Manufacturing Co., of Detroit.

The report was an exhaustive one, going into details regarding each proposition presented, and the reasons for the selection made.

The amount of the Huyett & Smith Manufacturing Co'. bid was $22,927. The bids ranged in price from $17,265 to $30,000. Among the bidders were the Fuller & Warren Co., I. D. Smead & Co., Boston Blower Co., and B. F. Sturtevant Co.

The contract will doubtless be awarded to the Huyett & Smith Manufacturing Co., in accordance with the recommendations of Mr. Baldwin.

The matter of heating and ventilating a school building is one of great moment, and the turning over by the Detroit School Board of a question of such vital importance to the life of the community, as the selection of a heating system, to a capable heating engineer is a step in the right direction, and one that might well be followed by other School Boards, the result of which would probably be that the schools throughout the country would be "ventilated" as well as heated.

THE Cortright Metal Roofing Co., of Philadelphia & Chicago, in their advertisement of this issue, direct attention to their Patent Improved Valley. Heretofore their Patent Valley has been made with one fold on each side to which the slates or shingles were attached. The improvement consists of an extra fold on each side thus forming double protection against driving storms. The folds provide amply for expansion and contraction of the metal. While this Valley is especially intended for use with their metallic tiles, shingles, etc., yet it is also used extensively with wood shingles and slate. It can be supplied in any weight of copper or brand of roofing tin. Full information and prices will be furnished by the above company on application.

THE B. F. Sturtevant Co., Boston, Mass., have printed a third edition of 10,000 copies of their 200 page General Catalogue which describes the uses of their Blowers, Exhausters, Engines, Forges and Heating and Ventilating apparatus and they desire to place a copy in the office of every superintendent, purchasing agent, engineer or manufacturer using such machinery. All who have not received a copy will confer a favor by applying to the above address at once. It will be mailed free of charge.

THE Willer Manufacturing Company of Milwaukee believe that they have in the north end of the gallery of the Liberal Arts Building of Chicago, an exhibit that will repay architects for whatever time they may find themselves able to spend in its examination. The exhibit shows their different classes of sliding-blinds, folding-blinds, Venetian blinds, screens and screen-doors, stairwork, etc.

BUILDING INTELLIGENCE.

Reported for the American Architect & Building News.

ALTERATIONS.

Brooklyn, N. Y.—*Willow St., No.* 159, two-and-one-half-st'y brick dwell., tin roof, two-st'y brick extension, tin roof, and other alterations; cost, $4,000; owner, P. S. Dudley, 270 Hicks St.; architect and builder, George Halbeck, 226 Fulton St.

Greene Ave., No. 473, three-st'y brownstone dwell., tin roof, raised one story, two-st'y brick extension, tin roof, added; cost, $4,000; owner, J. H. Ireland, 473 Greene Ave.; architect, W. Parker, 431A Quincy St.

Joralemon St., No. 93, four-st'y brownstone dwell., tin roof, two-st'y brick extension, tin roof, and internal and other alterations; cost, $3,000; owner, Mrs. Julia Spier, on premises; architects, D'Oench & Simon, 189 Fourth Ave., New York City.

Washington Ave., Nos. 66-68, one-st'y brick store, gravel roof, to be raised two stories; cost, $4,050; owner, H. M. Bischoff, 80 Hewes St.; architect, J. G. Glover, 186 Remsen St.

South Second St., No. 72, two-st'y frame dwell., tin roof, one-st'y brick extension, tin roof, and internal and other alterations; cost, $3,500; owner, J. J. McGinty, on premises; architect, John Smith, 185 Bedford Ave.

Adelphi St., No. 200, three-st'y brick dwell., tin roof, three-st'y brick extension, tin roof, and internal alterations; cost, $5,000; owner, John Flynn, on premises; architect, J. G. Glover, 186 Remsen St.

Bridge St., w s, 125′ n Myrtle Ave., five-st'y brick store, tin and gravel roof, one-st'y brick extension, tin and gravel roof; cost, $23,000; owner, Mrs. A. E. Darling, Utica, N. Y.; architect, H. L. Harris, 280 Broadway, New York City.

Camden, N. J.—*Mt. Vernon St.*, n w cor. Locust St., alteration to frame dwell.; owner, A. D. Geiger.

Sycamore St., No. 1202, *rear*, one-st'y frame addition; owner. Wm. Ross.

Washington St., No. 552, two-st'y brick addition owner, Chas. Johnson.

Chestnut St., No. 1109, one-st'y brick addition; owner, Ludwig Sheina.

Viola and Broadway Sts., addition to church; architect, Franklin P. Reynolds.

Central Ave., No. 952, one-st'y frame addition; owner, Sarah F. Jones.

Chicago, Ill.—E. Lembracht, two-st'y addition, 3125 Fox St.; cost, $3,000.

M. Schmitz, two-st'y addition, 386 Twenty-fourth St.; cost, $3,000.

August Dupki, two-st'y addition, 421 Washburn Ave.; cost, $3,000.

E. Emerich, three-st'y addition, 489 Franklin St.; cost, $5,000.

J. Boome, two basements, 88 Sedgwick St.; cost, $3,500.

F. Haaf, two additions, Lake Ave. and Forty-second St.; cost, $18,000.

Danville, Ga.—Centre College will build an addition, to cost about $30,000.

Doubling Gap Springs, Pa.—Three-st'y brick and frame addition to hotel; architect, T. Frank Miller, 1221 Arch St., Philadelphia.

Erie, Pa.—*East Ave. and Sixth St.*, addition to the school-house; builder, G. W. Fassett.

Manayunk, Pa.—Addition to the Manayunk Grammar School; architect, Jos. D. Austin, 713 Filbert St., Philadelphia.

Philadelphia, Pa.—*North Fifteenth St., No.* 1628, alterations to dwell.; owner, Mrs. S. Simon; architects, Baker & Dallett, s w cor. Walnut and Fifth Sts.

Thompson and Twenty-eighth Sts., three-st'y stone and brick addition to the Robert Morris Grammar School; builder, Thomas C. Trafford.

Church St., e s, s Wood St., two-st'y addition to mill; builders, Duncan & Shaw, 201 Green Lane.

Phœnixville, Pa.—Addition to the Church Street school-building; builder, John Keenan.

Providence, R. I.—*Westminster St.*, n s, one-st'y brick addition; cost, $5,000; owners, Shepard & Co.; builder, Jos. Nicholson.

(*Alterations Continued.*)

Waterman St., No. 113, two-st'y frame addition; cost, $6,000; owner, W. A. Peck; builder, W. E. Howand.

St. Louis, Mo.—Alterations to repair shops, s s North Market St., bet. Spring and Prairie Aves.; cost, $4,000; owners, Cass Ave. R'y Co.; contractor, R. M. Morrison & Co.

APARTMENT-HOUSES.

Boston, Mass.—*North Anderson St.*, cor. Parkman St., four-st'y brick apartments, flat roofs, 27.4' x 50.8'; owner and builder, S. Shocker.

Brooklyn, N. Y.—*Van Buren St.*, s s, 100' e Patchen Ave., 5 three-st'y brick flats, gravel roofs; cost, $4,000 each; owner, R. T. Griggs, 65 Eighth Ave.; architect, F. L. Hine, 301 Gates Ave.

Brooklyn Ave., e s, 100' n Atlantic Ave., 2 five-st'y brick flats, felt and gravel roofs; cost, $10,000 each; owner and builder, John A. Bliss, 875 St. Marks Ave.; architect, A. E. White, 190 Seventh Ave.

Chicago, Ill.—N. Michon, three-st'y flats, 229 Halsted St.; cost, $6,000.

G. Ottinger, three-st'y flats, 410 Washburn Ave.; cost, $3,000.

Philip May, three-st'y flats, 1904 Dearborn St.; cost, $6,000.

Paul Girsch, two-st'y flats, 69 Cleaver St.; cost, $3,500.

Andrew Thelander, four-st'y flats, 106-108 Sedgwick St.; cost, $5,000.

H. G. Page, two-st'y flats, 1991 Adams St.; cost, $12,000.

George Puegley, two-st'y flats, 1398 Jackson Boulevard; cost, $7,000.

John Behrens, three-st'y flats, 1315 Howard St.; cost, $5,500.

Ignats Reike, two-st'y flats, 1615 Dudley St.; cost, $4,000.

Van Pelt & Renz, 2 two-st'y flats, Juniata and Ninety-third Sts.; cost, $4,000.

Michael Daily, three-st'y flats, 8849 Buffalo St.; cost, $3,000.

S. Sigler, three-st'y flats, 6239 Ada St.; cost, $3,-500.

John Stark, two-st'y flats, 32 West Twenty-fifth St.; cost, $3,000.

E. A. Fox, two-st'y flats, 1189 Wilcox Ave.; cost, $4,000.

F. Pallem, two-st'y flats, 1020 West Twenty-second St.; cost, $6,000.

John Hemolka, three-st'y flats, 834 West Eighteenth St.; cost, $6,000.

Timothy Hurley, three-st'y flats, 239 Laflin St.; cost, $4,400.

C. Anderson, two-st'y flats, 6025 Throop St.; cost, 6025 Throop St,; cost, $3,000.

I. Sykes, two-st'y flats, 1491 West Congress St.; cost, $3,000.

Matt. Maran, three-st'y flats, 767 Van Buren St.; cost, $5,500.

John Lucas, three-st'y flats, 857 West Twentieth St.; cost, $5,500.

P. P. Block, two-st'y flats, 13 Hamburg St.; cost, $3,400.

M. Hirowlowski, two-st'y flats, 1038 North Hoyne Ave.; cost, $3,000.

F. M. Schille, three-st'y flats, 44 Lewis St.; cost, $6,000.

O. S. Aldrich, 2 two-st'y flats, 5644-5646 Green St.; cost, $10,000.

John Reid, two-st'y flats, 6613 Wabash Ave.; cost, $3,500.

E. Silando, two-st'y flats, One Hundred and Twelfth St., near Butterfield St.; cost, $3,000.

T. J. Tank, two-st'y flats, 423 North Wood St.; cost, $4,000.

Henry Uhlman, three-st'y flats, 636 Northwestern Ave.; cost, $3,500.

Rocco Pepon, three-st'y flats, 347 Noble St.; cost, $6,500.

L. C. Thatcher, three-st'y flats, 225 Spaulding Ave.; cost, $4,500.

John Waska, two-st'y flats, 1715 West Fifteenth St.; cost, $3,500.

August Reinke, three-st'y flats, 355 Hastings St.; cost, $3,500.

J. Knehlman, two-st'y flats, 6511 South May St.; cost, $3,500.

L. Duquetto, two-st'y flats, 1624 Cornelius St.; cost, $6,000.

(*Apartment-Houses Continued.*)

H. L. Olson, two-st'y flats, 1034 North Kedzie Ave.; cost, $3,000.

William Dahlston, two-st'y flats, 1038 Seminary Ave.; cost, $6,300.

T. N. Waite, three-st'y flats, Burnside Ave. and Cottage Grove St.; cost, $3,000.

M. O. Tremain, 3 two-st'y flats and barn, 4841 Forestville Ave.; cost, $14,000.

Robert Walsh, 3 three-st'y flats, 3764, 3800 and 3804 Adams St.; cost, $18,000.

K. Howe, three-st'y flats, 620 Washington Boulevard; cost, $10,000.

F. J. Dunne, two-st'y flats, 47 Utica St.; cost, $3,800.

H. Whittkind, three-st'y flats, 385 Twenty-fourth Pl.; cost, $6,500.

Wilson & Bennett, two-st'y flats, 6333 Sangamon St.; cost, $3,000.

Annie Dickunoss, two-st'y flats, 520 Cuyler Ave.; cost, $3,000.

New York, N. Y.—*One Hundred and Forty-ninth St.*, n s, 485' w Morris Ave., four-st'y brick flat, tin roof; cost, $16,000; owner, James O'Connell, 1690 Lexington Ave.; architect, Charles Baxter, 2580 Third Ave.

St. Louis, Mo.—Two two-st'y flats, s s Lucky St. bet. Vandeventer and Prairie Aves.; cost, $6,000; owner, Carrie Bradburn; builder, P. J. Bradburn.

Two two-st'y flats, n s Dickson St. bet. Twenty-second and Twenty-third Sts.; cost, $3,000; owner, Mary Loyd; builder, Alfred How.

Worcester, Mass.—*Millbury St.*, four-st'y brick and frame apartment block; owner, Hans Trulson; contractors, Harris & Beford; architects, Patstone & Lincoln.

Millbury St., four-st'y frame apartment block; owner, Dr. T. A. O'Callaghan; contractor, Wm. Power; architects, Earle & Fisher.

CHURCHES.

Brooklyn, N. Y.—*Moffat St.*, s s, 200' w Bushwick Ave., two-st'y frame church, tin roof; cost, $5,000; owners, Evangelical Home for the Aged, on premises; builders, John Rueger Building Co., 250 Moore St.

Bordentown, N. J.—Church for the Baptist congregation.

Butler, Pa.—Church of the United Presbyterian Society will be completed; cost, about $10,000.

Hagerstown, Md.—Church will be built for Zion Reformed Church, to cost about $40,000.

Manayunk, Pa.—Stone church for the Epiphany Lutheran congregation.

Red Bank, N. J.—Church for the Baptist Church; cost, about $25,000.

West Chester, Pa.—Stone church for the Westminster Presbyterian congregation.

FACTORIES.

Brooklyn, N. Y.—*Forty-first St.*, s s, 200' Fourth Ave., one-st'y brick watch factory, gravel roof; cost, $3,140; owners, John Wenstrom Co., 39 John St., New York City.; builders, Dolnecke & Bros., 134 South Ninth St., Brooklyn.

Chicago, Ill.—Cook & Rathbone, factory and engine-house, Union and South Branch Sts.; cost, $6,000.

New York, N. Y.—*Boulevard*, s w cor. West One Hundred and Thirty-first St., five-st'y brick factory, tin roof; cost, $60,000; owner, Wm. Riedell, 105 East One Hundred and Fourteenth St.; architects, Thom & Wilson, 1267 Broadway.

Bleecker St., s e cor. Elizabeth St., seven-st'y brick factory, tin roof; cost, $50,000; owner, John T. Williams, 54-56 Franklin St.

North Moore St., No. 9, six-st'y brick factory, tin roof; cost, $20,000; owner, Louis C. Friedline, 116 East Fifty-fourth St.; architect, G. F. Pelham, 1481 Broadway.

South Fifth Ave., No. 55, seven-st'y brick factory, tin roof; cost, $30,000; owner, D. P. Chesebro, 16 Seventh St. and Southern Boulevard; architect, Louis Korn, 261 Broadway.

Philadelphia, Pa.—*Jasper St.*, n s, s Clearfield St., two-st'y brick factory; owners, John R. Bill & Bro., Allegheny Ave. and Emerald St.

Allegheny Ave. and Nineteenth St., seven-st'y

(*Factories Continued.*)

brick factory and office-building; architect, Walter H. Geissinger, s w cor. Chestnut and Twelfth Sts.

Allegheny Ave., s e cor. Nineteenth St., seven-st'y brick factory; owner, W. G. Warden; architect, Walter Geissinger, s w cor. Chestnut and Twelfth Sts.

Webster, Pa.—Factory for the Pittsburgh Bottle and Glass Co.

Window-factory for Thomas Wightman & Son.

HOUSES.

Baltimore, Md.—Nelson C. Showacre, 3 three-st'y brick buildings, e s Madison Ave., bet. Bloom St. and North Ave.

Wm. J. Armiger, 5 two-st'y brick buildings, w s Burke St., n Jefferson St.; 5 two-st'y brick buildings, e s Bradford Alley, n Jefferson St.; and 12 two-st'y brick buildings, n s Jefferson St., beg. n w cor. Burke St.

Thomas F. Locke, 15 three-st'y brick buildings, s s Edmondson Ave., w Monroe St.

Hy. Schlessinger, 8 two-st'y brick buildings, n s O'Donnell St., bet. Hare and Potomac Sts.

Edward F. Shadrick, 7 three-st'y brick buildings, w s York Road, beg. s w cor. Oxford Ave.; and 8 two-st'y brick buildings, s s Oxford Ave., w York Road.

Hy. Shirk, 3 three-st'y brick buildings, w s Mt. Vernon Ave., bet. Twenty-fourth and Twenty-fifth Sts.

Albert N. Mahone, 10 two-st'y brick buildings, w s Buchanan St., bet. Twenty-fourth and Twenty-fifth Sts.

Boston, Mass.—*Sanford St.*, near Cedar St., Ward 24, frame dwell., 24' x 46'; owner, Jacob Ripley.

Boylston Ave., near Unnamed Pl., Ward 23, 2 three-st'y frame dwells., hip roofs, 21.6' x 47'; owner, Patrick Doyle; builder, G. A. Cahill.

Kirk St., near Carl St., Ward 23, frame dwell., 27.6' x 54.10'; owner and builder, C. P. Botsford.

Milton Ave., near Norfolk St., Ward 24, frame dwell., 22' x 53.6'; owner, Miss M. E. Whelan; builder, P. F. Maher.

Oakley St., Nos. 4-27, Ward 24, twelve frame dwells., 25.6' x 29'; owner, Workingmen's Building Association; builder, J. D. McLellan.

Franklin St., opp. Holton St., Ward 25, two frame dwells., 17' x 50.4'; owner, I. N. Tucker; builder, James McNiel.

Holborn St., near Galena St., Ward 21, frame dwell., 27' x 37'; owner and builder, Peter Graffam.

Boylston St., cor. Burnside Ave., Ward 23, three-st'y frame dwell., 24' x 47'; owner, F. W. Dahl; builder, James Hunter.

Greenhayes St., near Cedar St., Ward 24, frame dwell., 24' x 43'; owners, D. & W. Jameson; builder, Hugh Chisholm.

Woodward Park St., near Folsom St., Ward 20, three-st'y frame dwell., flat roof, 26' x 57'; builders, Decker Bros.

Magnolia St., cor. Unnamed St., Ward 20, frame dwell., 19.6' x 48'; owner, F. A. Keith; builder, W. P. Jenkins.

Gaston St., Nos. 21 and 33, and near Blue Hill Ave., Ward 21, three frame dwells., 27' x 40' and 27' x 37'; owner and builder, Peter Graffam.

Southwood St., near Blue Hill Ave., Ward 21, three-st'y frame dwell., pitch roof, 25.10' x 29.4'; owner, Mrs. J. S. Regan; builders, McNiel & McLean.

Woodward Park St., near Folsom St., Ward 20, three-st'y frame dwell., flat roof, 26' x 57'; owner, N. E. Hutchins; builders, Decker Bros.

Dunham Park, from 56 West Fifth St., Ward 15, three-st'y frame dwell., flat roof, 21' x 30'; owner, Harrison Dunham; builder, W. H. Morrison.

Hastings St., rear, near Centre St., Ward 23, frame dwell., 21' x 31'; owner, F. C. Gillson; builder, G. A. Spear.

Brooklyn, N. Y.—*Stockholm St.*, n s, 102' w Wyckoff Ave., 2 three-st'y frame dwells., tin roofs; cost, $4,000 each; owner and builder, A. Huber, 900 Flushing Ave.; architect, H. Smith, 10 Moore St.

Franklin St., w s, 50' n Colyer St., three-st'y brick dwell., gravel roof; cost, $6,000; owner, F. McFadden, 45 Franklin St.; architect, P. Dillion, Manhattan Ave.; builder, Wm. P. McGarry, 210 Colyer St.

Grand Ave., w s, 209' n Gates Ave., 3 three-st'y brick dwells., gravel roofs; cost, $4,500 each; owner,

LOCALITY OF AUTHORSHIP OF DESIGNS

PUBLISHED IN THE AMERICAN ARCHITECT.

The assertion that the *American Architect* is a paper whose characteristics are *national* and not merely local is supported by the following table, which exhibits the manner in which several journals have treated domestic architecture. In this comparison the IMPERIAL edition of the *American Architect* is considered, since the additional plates of the INTERNATIONAL edition are, in the main, illustrations of foreign work.

PAPER.	Number of subjects contributed.	Number of contributing architects.	Towns in which contributors were established.	States in which contributors were established.	Architects practising in the State of publication furnished. Subjects.	Per cent of total number of subjects.	Different architects contributing.	Per cent of total number contributing architects.	Towns.
No. I. . . .	214	109	28	16	161	.752	75	.688	7
No. II. . .	137	78	21	15	46	.335	24	.307	2
No. III. . .	118	56	16	11	70	.593	22	.392	1
Am. Architect.	267	152	47	24	73	.273	39	.256	3

In the first column, "subjects," only actual domestic work is included (foreign work, imaginative designs and the work of sketch-clubs are excluded), and the figures there given indicate that this number of designs might have been prepared by the same number of architects practising in the same number of different towns. The remaining columns show how nearly this ideal distribution has been reached in each case.

From this table it appears that Massachusetts architects—.256 per cent of the total number of contributors—provided only .273 per cent of the total number of designs published, percentages which, in view of the fact that Massachusetts is one of the most populous States in the Union, prove that they have not been accorded an unreasonable amount of our limited space.

(*Houses Continued.*)

Isabella de Maziere, Dunnellen, N. J.; architect, F. L. Hine, 801 Gates Ave.

Union St., n s, 99' w Fifth Ave., 3 four-st'y brick dwells., tin roofs; total cost, $16,500; owner, Thos. F. Martin, 321 Fourth Ave.; architect, W. M. Coots, 189 Montague St.

Forty-eighth St. n s, 200' w Fifth Ave., two-st'y brick dwell., tin roof; cost, $3,000; owner, V. Patterson, Forty-eighth St. and Fifth Ave.

Garfield Pl., n s, 116' w Sixth Ave., 2 four-st'y brick dwells., tin roofs; cost, $10,000 each; owner and builder, G. J. Murtagh, 678 Carroll St.; architects, I. D. Reynolds & Son, 383 Fulton St.

Prospect Pl., s s near Grand Ave., four-st'y brick dwell., gravel roof; cost, $10,000; owner, P. Donlon, 789 Dean St.; architect, Jas. Patrule, 716 Fulton St.; builder, Thos. Donlon, 785 Dean St.

North Seventh St., s s, 125' w Rochling St., 2 four-st'y frame dwells., tin roofs; cost, $6,000 each; owner, R. Brantigan, on premises; architect, F. J. Berlenbach, Jr., 260 Graham Ave.

Troutman St., n s, 150' e Central Ave., three-st'y frame dwell., tin roof; cost, $4,300; owner, H. Josenhaus, 167 Troutman St.; architect, E. Schremff, 534 Bushwick Ave.

Starr St., n s, 225' w Hamburg Ave., three-st'y frame dwell., tin roof; cost, $4,500; owner, August Grenzig, on premises; builders, John Rueger Building Co., 250 Moore St.

Sackett St., s s, 92' w Fifth Ave., 3 four-st'y brick dwells., tin roofs; cost, $22,500; owner and builder, Wm. Assip, 224 Sixth Ave.; architect, W. M. Coots, 189 Montague St.

Gates Ave., s s, 200' w Knickerbocker Ave., three-st'y frame dwell., tin roof; cost, $4,600; owner, J. Taylor, 1394 Gates Ave.; architects, Frank & Hillenbrand, 200 Knickerbocker Ave.; builder, Chas. Welscher, 350 Evergreen Ave.

Bleecker St., n s, 105' w Knickerbocker Ave., 5 three-st'y frame dwells., tin roofs; cost, $5,000 each; owner and builder, Wm. Berlinger, 1255 Green Ave.; architects, Frank & Hillenbrand, 200 Knickerbocker Ave.

Plaza St., n w cor. Union St., two-st'y brick dwell., tile and tin roof; cost, $60,000; owner, Geo. W. Shiebler, 179 Broadway, New York City; architect, F. Freeman, 132 Nassau St., New York City.

Barbey St., w s, 300' n Arlington Ave., two-st'y frame dwell., shingle roof; cost, $3,500; owner, Frank E. Van Dupree, 108 Linwood St.; architect, A. McLean, 134 Ridgewood Ave.

Third St., s s, 117' w Eighth Ave., three-st'y brick dwell., tin roof; cost, $10,000; owner, Thos. B. Hall, 364 Twelfth St.; architect, W. M. Calder, 371 Sixth Ave.

Garden St., w s, 336' s Flushing Ave., three-st'y brick dwell., tin roof; cost, $7,000; owner, F. Schwalb, 63 McKibben St.; architect, H. Loeffler, Jr., 851 Gates Ave.

Decatur St., s s, 95' w Stuyvesant Ave., 10 three-st'y brick dwells., tin roofs; cost, $8,000; owner, E. H. Bishop, 647 Putnam Ave.; architect, M. Dahlander, 186 Remsen St.

Berkeley Pl., n s, 100' w Seventh Ave., 3 four-st'y brick dwells., tin roofs; cost, $7,000; owners, builders and architects, Delancy & Collins, Berkeley Pl., bet. Sixth and Seventh Aves.

Dean St., No. 1345, four-st'y brick dwell., tin roof; cost, $7,500; owner, Frank Jenks, 315 State St.; architect, E. Hazzard, 175 Pacific St.

South Fourth St., s s, 250' e Hooper St., four-st'y brick dwell., tin roof; cost, $9,000; owner and builder, George Straub, 809 Willoughby Ave.; architect, Th. Engelhardt, 905 Broadway.

Bushwick Ave., n w cor. Moffat St., two-st'y frame dwell., shingle roof; cost, $5,500; owner, Dr. Wm. A. Myers, near premises; architect, A. H. McGeehan, 2581 Atlantic Ave.

Christopher St., e s, 100' s Sutter Ave., and *Jackman St.*, w s, 100' s Sutter Ave., 2 three-st'y frame dwells., tin roofs; cost, $6,000 each; owner, John

(*Houses Continued.*)

Dailey, Marion St., near Hopkinson Ave.; architect, L. Dananchet, 31 Watkins St.

Atlantic Ave., s s, 329' 7½" w Cypress Ave., 3 two-st'y frame dwells., tin roofs; cost, $1,200 each; owner, Sophia A. Scopkins, Union, Union Co., N. J.

Fourth St., s s, 78' e Sixth Ave., four-st'y brick dwell., tin roof; cost, $6,500; owner, Louis Bonert, on premises; architect, W. M. Coots, 189 Montague St.

Arlington Ave., n e cor. Elton St., two-st'y frame dwell., shingle roof; cost, $5,500; owner, E. R. Vollmer, Etna and Richmond Sts.; architect, Henry F. Kilburn, 229 Broadway, New York City.

Alabama Ave., w s, 199' 3" s Atlantic Ave., 2 two-st'y frame dwells., tin roofs; total cost, $3,000; owner, Fred. Sievert, 630 Broadway.

Camden, N. J. — *South Third St., No.* 639, two-st'y brick dwell.; owner, C. S. Ackley.

South Fourth St., No. 15, three-st'y brick dwell.; owner, B. F. Schroeder.

Kaighn's Ave., w s, e Tenth St., 11 two-st'y brick dwells.; owner, J. S. Jackson.

Chelten Ave. and Miller St., 2 two-st'y brick dwells.; owner, W. K. Moore.

Chicago, Ill.—S. P. Heskett, 5 two-st'y dwells., 1215-1225 Fifty-seventh St.; cost, $10,000.

C. Tatge, two-st'y dwell., 750 Englewood St.; cost, $3,000.

N. H. Boroman, three cottages, 2429-2433 Thirty-eighth St.; cost, $3,000.

James Sackley, two-st'y dwell., 1768 Washington Boulevard; cost, $10,000.

John Peterson, two-st'y dwell., 29 Truro St.; cost, $3,000.

William Ohlhaber, two-st'y dwell., Southport and Belmont Aves.; cost, $8,000.

Aug. Schultz, four-st'y dwell., 175 West Randolph St.; cost, $3,000.

Columbia, Pa. — Six brick dwells.; contractor, Mr. Sneath.

Langhorne, Pa. — *Pine St.*, dwell.; owner, Horace Woodman.

Lansdowne, Pa. — Two cottages; owner and architect, Frank A. Hays, Drexel Building, Philadelphia; builder, Frank Riggs.

Morganville, N. J. — Cottage; cost, $3,000; owner, J. H. Becker.

Newark, N. J. — Two-and-one-half-st'y frame dwell. for W. I. Beatty; architects, Schweitzer & Diemer, Bennett Building, New York.

Overbrook, Pa. — Several brick, stone and frame dwells.; builders, Wendell & Smith.

Philadelphia, Pa. — *Orleans St.*, s s, e Ruth St., 6 two-st'y brick dwells.; builder, Valentine Lind, 3210 Lee St.

Ruan St., n Frankford Ave., 4 three-st'y brick dwells.; builder, Andrew Anderson, 3471 Weikel St.

Green St., s s, near Thomas St., two-st'y brick dwell.; builder, Andrew Anderson, 3471 Weikel St.

Foulkrod St., e s, s Large St., two-st'y brick dwell.; builder, W. W. Worrell, 2114 East Orthodox St.

Linda St., n s, w Hancock St., 8 two-st'y brick dwells.; owner, W. Smaltz, 1545 Hutchinson St.

Ridge St., n s, w Penn St., two-st'y brick dwell.; builder, Wm. Keas, 4624 Penn St.

Front St., w s, s Westmoreland St., two-st'y brick dwell.; builder, Jos. Heaton, 3941 Marshall St.

Church St., e s, n Garden St., two-st'y brick dwell.; builders, Davies & McDonald, 1339 Sellers St.

Haworth St., e s, s Frankford Ave., 2 two-st'y brick dwells.; builder, E. H. Allen, 1618 Sellers St.

Tioga St., n e cor. Seventh St., three-st'y brick dwell.; builder, F. B. Franks, 2215 Emerald St.

Wayne St., s e cor. Dennis St., 7 two-st'y brick dwells.; builder, James Mole, 1718 Cayuga St.

(*Houses Continued.*)

Ann St., n s, s e Weikel St., 2 two-st'y brick dwells.; builder, W. W. Barnes, 3384 Frankford Ave.

Cherry St., n s, e Wakeling St., two-st'y brick dwell.; builder, Thos. Rush, 4938 Mulberry St.

Germantown Ave., e s, s Dauphin St., three-st'y brick dwell.; builder, Henry G. Schultz, 2633 Germantown Ave.

Pittsburgh, Pa.—Dwell.; owner, W. C. Berger.

Haldane St., dwell.; owner, Edward Dewar.

Birmingham Ave., dwell.; owner, George Knell, St. Louis, Mo.

OFFICE-BUILDINGS.

Philadelphia Pa. — *Poplar St.*, s s, e Forty-first St., two-st'y brick office; builder, G. W. Steinmetz, Sixtieth and Haverford Sts.

SCHOOL-HOUSES.

Chicago, Ill. — Board of Education, three-st'y school-house; 232-256 Cornelia St.; cost, $70,000.

Easton, Pa.—School-house; architect, John M. Stewart.

Greenville, Tenn. — Brick school-building, to cost $12,000, will be built.

Johnstown, Pa. — School-house; architects, Smith & Robinson.

Lock Haven, Pa. — School-house soon to be built.

San Antonio, Texas. — Catholic College, to cost about $75,000, is in contemplation.

Shenandoah, Pa. — School-house; builder, William Long.

STABLES.

Brooklyn, N. Y. — *Bridge St., No.* 286, two-st'y brick stable, gravel roof; cost, $3,300; owner, Estate of Mary B. Wellsher, Capt. Campbell, Trustee; architects, Parfitt Bros., Court St.; builder, O. K. Buckley, 150 Navy St.

Camden, N. J. — *Sylvan and Seventh Sts., rear*, one-st'y frame stable; P. Hooley.

Philadelphia, Pa. — *Edmund St.*, w s, s Princeton St., two-st'y brick stable; builder, P. E. Costello, Tacony.

Pulaski St., w s, n Apsley St., one-st'y brick stable; builder, Geo. Wood, 4546 Rubicam St.

Hofnagle St., s s, e Erie Ave., two-st'y brick stable; builder, Jos. Ashby, Fox Chase, Pa.

Oak Lane, w s, e Tenth St., two-st'y brick stable; builders, Boyer & Parker, Station A, Oak Lane.

Bridge St., n w cor. Jackson St., two-st'y brick stable; builder, Amos W. Linn, 4647 Garden St.

Broad St., w s, s Brown St., one-st'y brick stable; builders, Hoersch & Weidner, 3601 North Fifth St.

Gibson's Ave., e s, n Eighty-sixth St., one-st'y brick stable; builder, Wm. Exley, Eighty-sixth St. and Gibson s Ave.

Belmont St., w s, s Girard Ave., two-st'y brick stable; owner, Jos. Smith, 1037 Belmont Ave.

Sears St., n s, e Twenty-third St., two-st'y brick stable; owner, John Develin, 1008 South Forty-sixth St.

Wharton St., s s, e Twenty-third St., two-st'y brick stable; owner, John Develin, 1008 South Forty-sixth St.

Thirty-fourth St., w s, s Lehigh Ave., two-st'y brick stable; builder, C. E. Bartle, Thirty-third St. and Lehigh Ave.

Pechin St., e s, w Penn St., two-st'y brick stable; builder, Patrick O'Keefe, 449 Manayunk Ave.

Oak St., No. 126, *rear*, two-st'y brick stable; builder, Jacob H. Leiser, 1612 North Sixteenth St.

Sixty-third St., w s, n Girard Ave., one-st'y brick stable; builders, Chas. Smith & Son, 4215 Haverford St.

South Vine St., No. 63½ *rear*, two-st'y brick stable; S. A. Wiker, 63½ South Vine St.

(*Continued on page 7.*)

THE AMERICAN ARCHITECT AND BUILDING NEWS

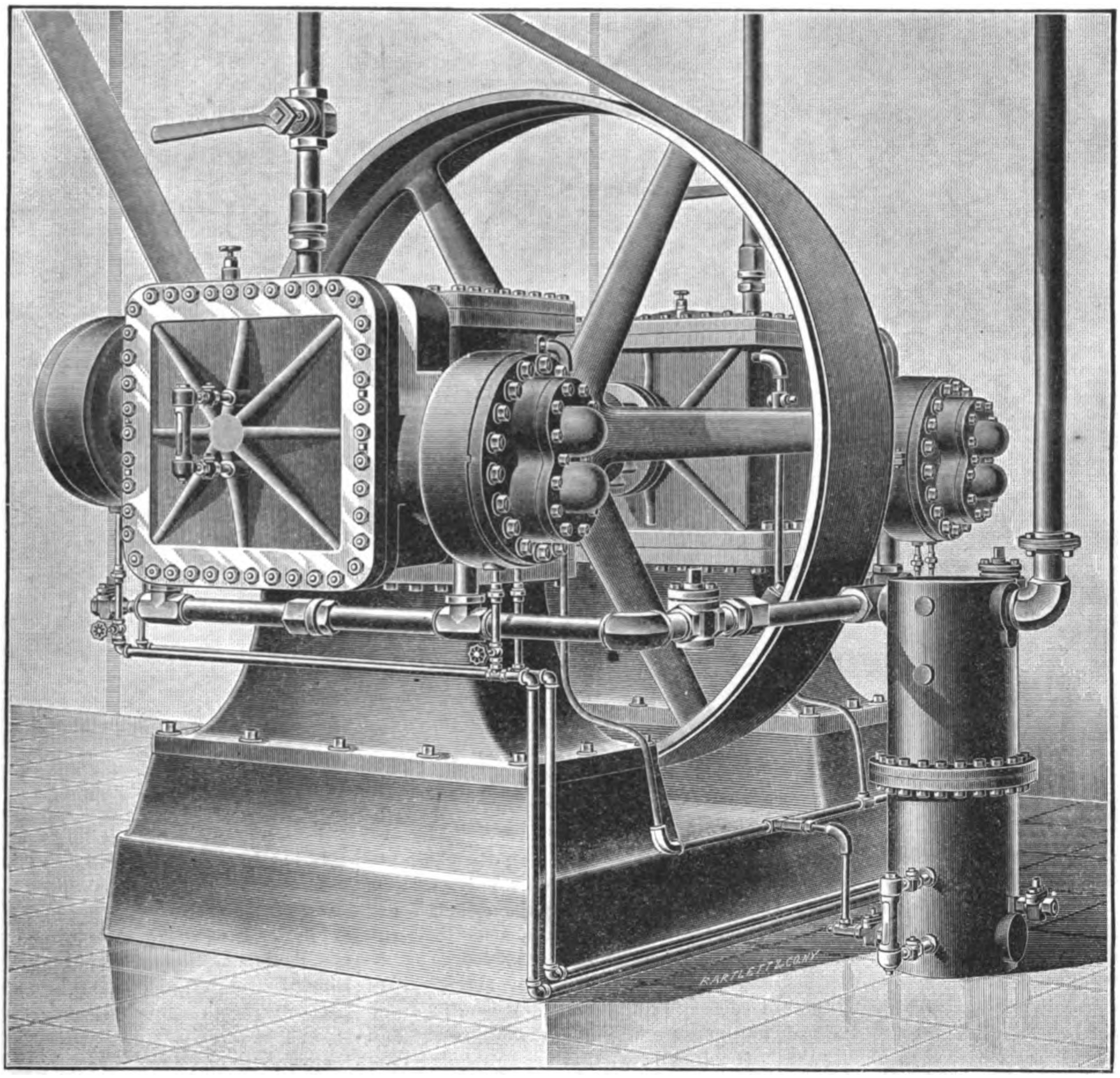
ADVERTISERS' TRADE SUPPLEMENT.

No. 134. SATURDAY, AUGUST 5, 1893. VOLUME XLI. No. 919.

ARTIFICIAL COLD.

BEST METHOD OF SUPPLYING IT — A NEW AND IMPROVED APPARATUS.

THE manufacture and use of artificial heat is of every-day comprehension, and is indispensable in the most ordinary relations of civilized life. The manufacture and use of artificial cold, although equally as simple and available, is a generation or two later in history, and, in fact, is just now approaching the culmination of its practical application. The first general application of artificial cold was in the manufacture of ice, and naturally this had its origin in warm climates. As the process became simplified and its cost of operation reduced, its area of utility extended, so that it soon absorbed the field of direct refrigeration. Not only this, but it worked its way geographically from warm climates into cold ones, until artificial refrigeration is indispensable in many industries, and artificial ice a common article of merchandise. It is not a little surprising, however, to see the manufacture of artificial ice steadily force its way against the apparent "natural monopoly" of the natural product. But such is incontestably the fact, and not only has artificial ice become a necessity in interior cities, but is rapidly securing a foothold in the frozen regions of New England itself. The extension of artificial refrigeration is even more rapid and wide, for reasons which are more directly obvious, and it may be fairly stated that the time has come when artificial cold in either of its applications is shown to be more manageable, more satisfactory on grounds of hygienic safety and convenience, and more economical in its results, than the crude forms of cooling by natural ice heretofore in vogue.



The well-known firm of engineers, Westinghouse, Church, Kerr & Co., are generally credited with a quick perception of a public demand, and good judgment as to the best method of supplying it. It is not surprised, therefore, to find them entering the field of artificial refrigeration with a new and characteristic apparatus which gives

evidence of a sound mechanical discrimination.

We take pleasure in reproducing from a recent circular issued by us two or three general illustrations of the apparatus employed. Reviewing the circular very briefly, it would appear that the general extension of the field of artificial refrigeration has been thus far prevented by the fact that the apparatus employed is in the nature of the case cumbersome and expensive in first cost, and more or less complex in its operation. This has not been a practical objection so long as its use was confined to large enterprises, like ice-making plants, cold-storage warehouses, breweries, etc. In these industries the refrigerating-plant has the benefit of abundant capital to install it and plenty of attention to maintain it. The apparatus hitherto designed has been of such a nature that its cost, when reduced to plants of moderate or small capacity, has been entirely disproportionate, and thus the limit of its marketability has been quickly reached.

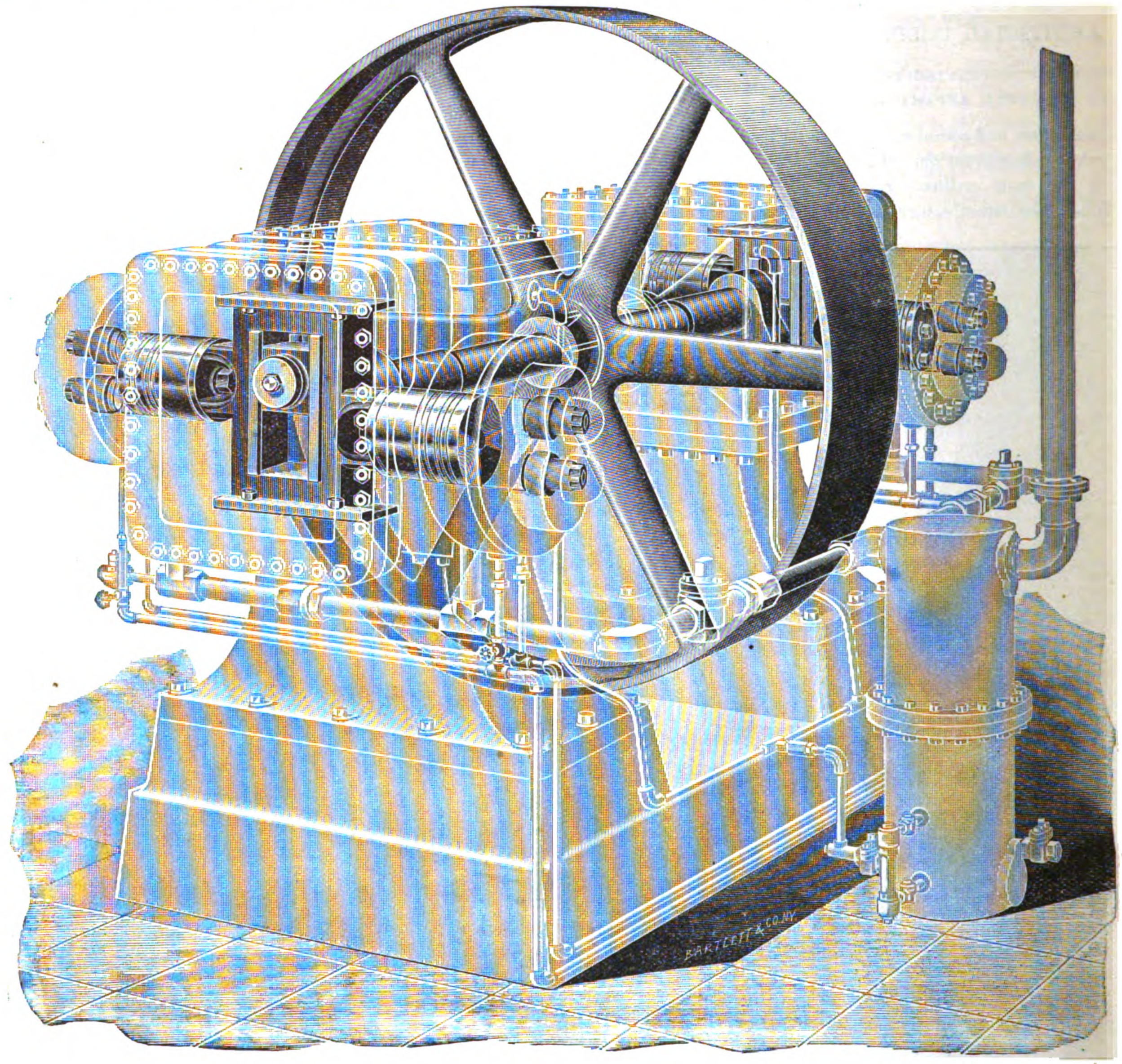
All sorts of attempts have been made to design a compression system in which the large units might be subdivided without a material increase of cost per ton of capacity, but the designers seem to have failed to get out of the old ruts, not having apparently grappled with the problem in its original principles.

The firm above named has, with characteristic boldness, begun at the beginning, and sized up the requirements without much reference to existing forms of construction. We illustrate the compressor, both by a general view and transparent view, showing its working parts, from which its simplicity will become apparent. Compression hitherto has been, almost without exception, driven by some form of direct-connected engine, which is virtually a part of the machine. It is obvious that a compressor which could be belt-driven from any existing source of power, or from any form of engine or electric motor, would find a market from which it was debarred when a special engine was a necessity. To accomplish this, increased rotative speeds were necessary, which in turn led to the necessity of extreme compactness and rigidity, and above all to a distribution of the compression strains with some degree of uniformity over the whole circle of revolution. This has been accomplished in the new form of compressor, which may be described in a word as a "double-duplex." Each side carries two single-acting cylinders opening into a crank-chamber and supported on a pedestal, the two pedestals being bolted to a massive common base. By thus bringing the cylinders and shaft close together the long connections with piston-rods and crossheads, and the cumbersome frames which they make necessary, are done away with, as are also the stuffing-boxes which are a source of unqualified annoyance.

It will be noted that the two cylinders of each crank-chamber are not in line with each other, but are placed respectively above and below the centre line by a distance equal to one-half of the crank radius. The effect of this is to improve the angle of thrust of the crank as the resistance of compression increases toward the end of the stroke.

Motion is transmitted to the pistons through a massive yoke on the opposite side of which they are directly unbolted. Adjustable gibs on the inside and outside of the yoke relieve the cylinders of wear and take care of the side thrust. The entire working-parts revolve in an enclosed chamber filled with oil, not only reducing the friction and wear to a minimum but serving as a seal against the escape of free ammonia. The suction and delivery valves are in the head and can be removed and replaced in a few minutes. The cylinder itself is bushed with a heavy cast-iron sleeve which can be removed in case of wear. The space around the sleeve forms a water-jacket.

The solid connection of the pistons and yoke, without intermediate pin or brasses, provides that the total distance from head to head of the pistons can be finished so that the clearance space is not only made practically zero but maintains itself naturally without



suffering from increase due to wear. It is well understood that upon this matter of clearance the efficiency of a compressor largely depends. The two cranks being at right angles, the four resisting strains are equally distributed through the entire revolution, so that the compressor runs without any surge upon the belt, and with a degree of friction which is apparently insignificant as compared with any other form of apparatus.

The important principle of subdivision of units, which has made for itself a fixed place in many departments of steam-engineering, is now for the first time applied in its full value to refrigeration. Instead of a single unit of, for instance, sixty tons, two units of thirty tons, three units of twenty tons, or four units of fifteen tons may be employed, just as the best consideration of local conditions may

determine. Of course, the risk of loss from stoppage is subdivided in proportion to the number of units, and a spare unit can be kept in reserve at small cost. Moreover, most plants either for refrigeration or ice-making, vary in their required capacity between very wide limits at different seasons of the year. By subdividing the units the initial capacity of the plant is made to keep pace with the fluctuating requirements with no more trouble than is involved in the shifting of a clutch or the stopping of an engine.

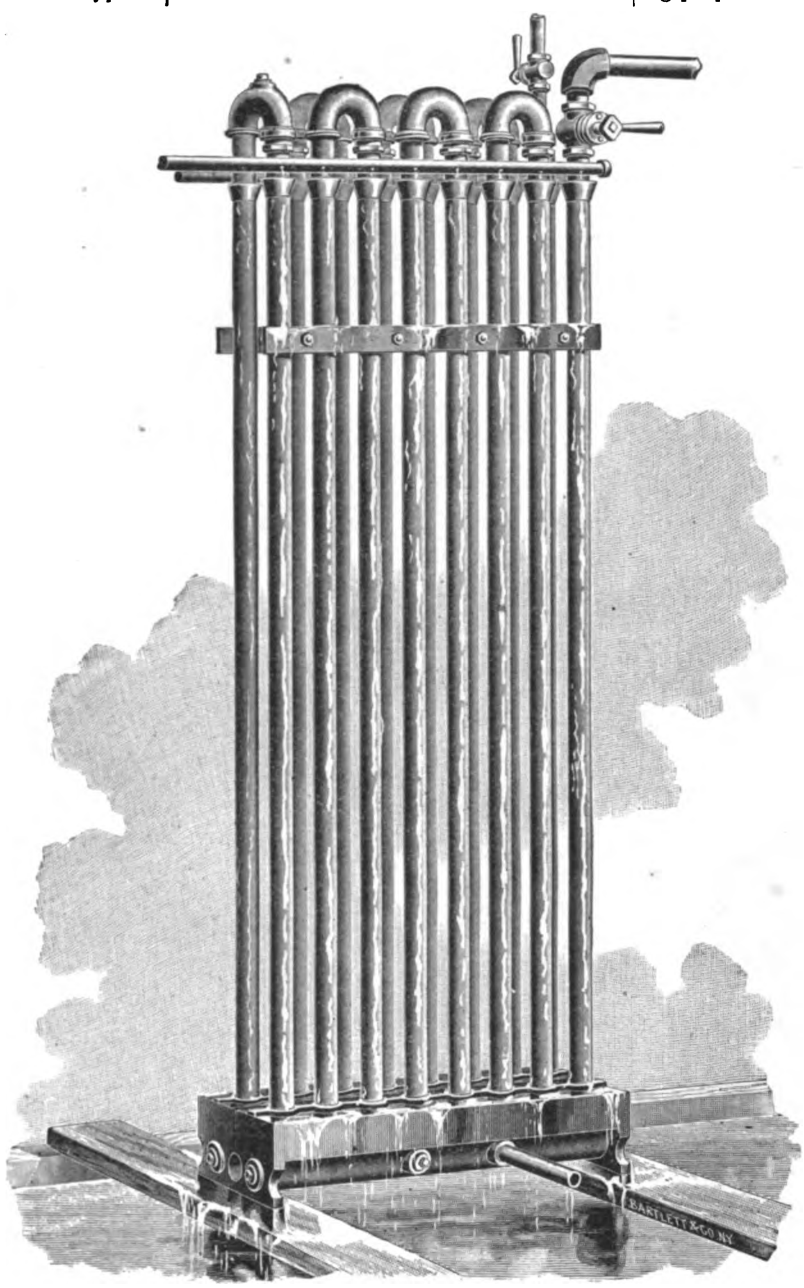
The saving of space is a very marked advantage in this design. The ordinary compressor is a two-story machine, and with its horizontal engine cuts heavily into the floor-capacity of a building. With the type of compressor here illustrated the whole apparatus can be erected in a basement or sub-basement, leaving the receiving or working floors of the building unobstructed.

The subdivision of units also implies practical flexibility as to enlargement. It is seldom that a manufacturer can forecast his requirements in any department, and particularly is this true of refrigeration. If he is compelled to purchase his whole capacity in a single unit, it may prove to be too large, and he suffers in economy; or, as his business increases, it will be too small, in which case the remedy is found only in a disproportionate additional expenditure. By the employment of sub-divided units the manufacturer may install with reference to his immediate and definitely known capacity, with a certainty that he can increase, from time to time, at a cost which is strictly proportional to the increase of his requirements. This feature is of large importance in almost any industry employing refrigeration, but it is particularly so in the manufacture of artificial ice, in which the ultimate growth of the demand is almost an indeterminate quantity.

The condenser illustrated shows equal evidence of a thorough understanding of the problem involved. The usual form of condenser employs horizontal coils of pipes, water being led on at the top and spattering down over the coils, falling from pipe to pipe. A large percentage of the water is thus wasted. The coils themselves are usually continuous with welded joints, making them expensive in first cost, expensive to repair, expensive to increase and without flexibility under variable loads.

The condenser here shown is in sections, strictly uniform and in duplicate. They are, therefore, carried in stock, and in setting up the condenser a given number of sections are merely placed in position and bolted together. If the plant is to be enlarged more sections are added. If any section becomes disabled it can be taken out and replaced without loss of time. If the work becomes light in the winter season any number of sections can be cut out of service. The whole condenser occupies a minimum of floor-space.

Its particular advantage, however, is in the use of water. Instead of dashing wastefully from pipe to pipe, as with horizontal coils, the water is delivered to the top of the pipe down which it slowly creeps in the form of a thin film without any loss from spattering. Partial evaporation takes place, which is promoted by a casing surrounding the entire condenser. The latent heat of the water is thereby partly utilized, and an economy results which is stated to be greatly superior to that of any other form of condenser, often resulting in a saving of two-thirds of the water otherwise employed.



The manufacture of artificial ice is one of the most attractive applications of refrigerating apparatus. It is particularly so at this time when combinations among the natural-ice companies have defeated the efforts of Dame Nature. Further than this, in the densely populated districts the natural sources of ice-supply are so rapidly deteriorating that the sanitary question has been made the subject of legislative action. In some districts the harvesting of local ice is already prohibited, and many municipal governments are compelling an inspection of ice under chemical analysis. The Massachusetts State Board of Health has taken the lead in this important investigation, out of which has come a state of public feeling which will either compel the ice to be brought long distances from apparently pure sources of supply, or to be made artificially on the spot. Artificial ice is invariably made from distilled, reboiled water, doubly filtered through charcoal, and the product is thereby as nearly pure as any form of commercial treatment can make it.

Artificial refrigeration is an application scarcely less interesting. Not only is it very much cheaper as a rule than natural ice but it gives that which cannot be obtained in any other way — a dry, pure, atmosphere. The dampness inevitable with the use of ice is entirely absent, making it possible to preserve many goods that moisture would speedily ruin, and to preserve all goods much sweeter and for longer time.

Moreover, natural ice, especially for cooling purposes, is often harvested from impure ponds or canals, so that when it melts it necessarily fouls the air or leaves a deposit of filth behind it, impregnating and rotting all the wood with which it comes in contact and damaging the goods in storage. The moisture-laden air soon becomes thoroughly impregnated with the volatile products of the provisions stored, in time taking on the smell of rancid oil which can easily be detected on entering the storerooms. This rancid vapor is a favorable medium for the generation of disease-germs, all of which is coming to be well recognized. In artificial refrigeration all vapor, pure or otherwise, is taken from the air and deposited upon the chilled surface of the pipes, where the temperature is so low that the noxious germs, if present, are powerless for evil. The air of such a storeroom is sweet and dry, much resembling that of the high table-lands of the West, where meat will dessicate without decay in the open air, owing to the absence of moisture.

Sudden transitions from moderately warm to excessively hot weather, and vice versa, are well known to injure some classes of merchandise more than a steady temperature many degrees higher. By artificial refrigeration these and all other conditions are constantly under control.

The field for artificial refrigeration seems to be endless, including markets, creameries, refineries, chemical-works, wine-cellars, confectioners, steamers, hotels, hospitals, apartment-houses, safe-deposit companies (for storage of furs), and similar industries in which it has not thus far been available, to say nothing of cold-storage warehouses, breweries, packing-houses, etc., in which it has already become an established necessity.

WESTINGHOUSE, CHURCH, KERR & CO.,
620 Atlantic Ave., Boston, Mass.

Price list No. 6 has just been issued by the Okonite Company Limited from the New York headquarters, 13 Park Row. It is a pamphlet of over fifty pages, containing a fund of

valuable information concerning the celebrated product of the Company and should be in the hands of every one interested in the perfect insulation of telephone, telegraph, electric-light and power wires and cables. The covers are rich in appearance and elaborately designed and show a lithographed title into which the well-known Okonite trademark enters conspicuously, the whole showing off finely on a gold background. There is also a view of the Company's works at Passaic, N. J. and Manchester, Eng.

A LARGE GLASS ROOF.

THE New York Industrial Building (Grand Central Palace) occupies the entire block, bounded by Lexington Avenue, Depew Place, and 43d and 44th Streets, adjoining the Grand Central Depot, New York City. It covers an area 200 x 275 feet, with a floor-space of 310,000 square feet. A notable

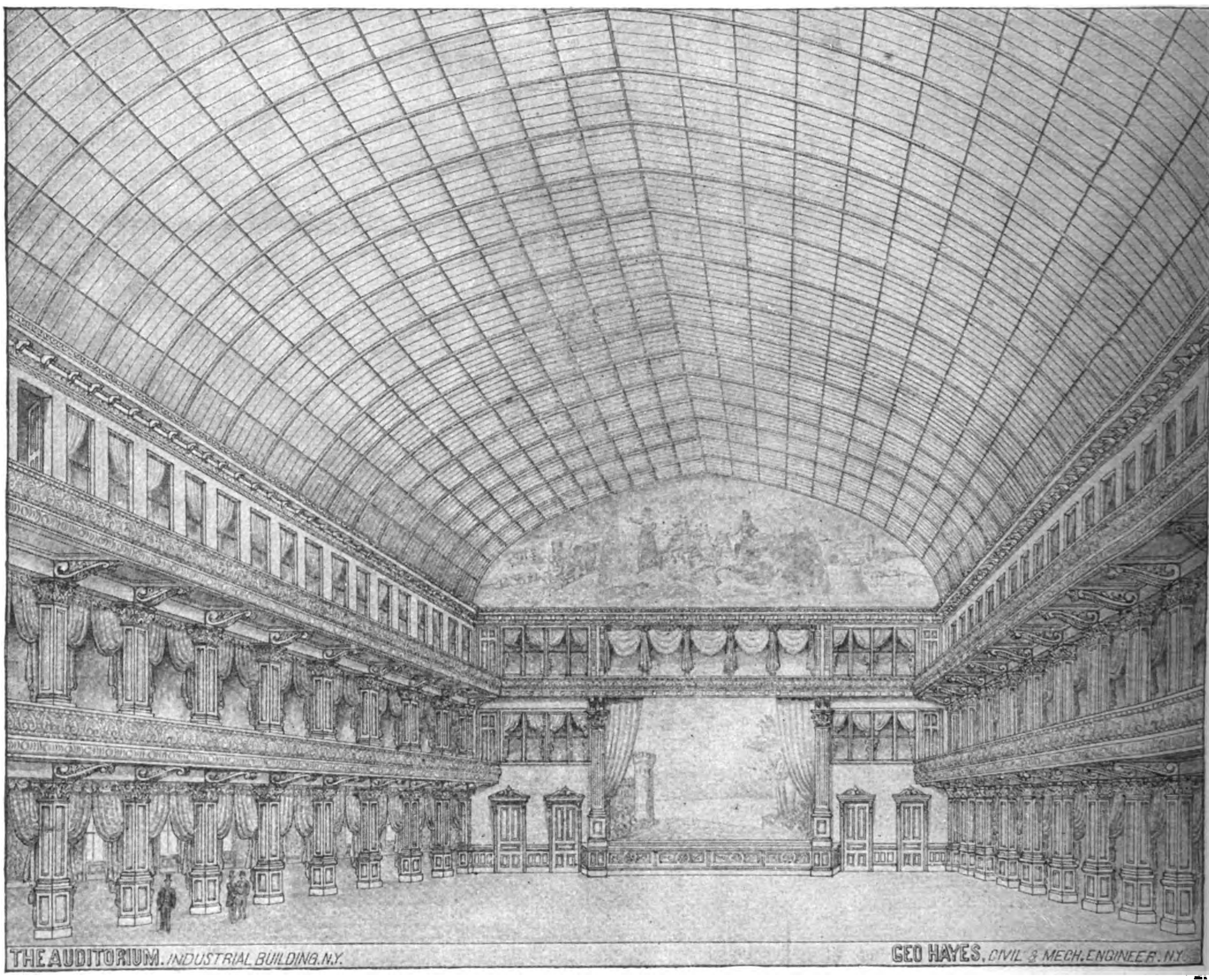


Fig. 1. Interior View.

feature of this building is the glass arch over the auditorium, which has a clear span of 84 feet, and is 155 feet in length. The two large illustrations presented herewith give some idea of the extent of this roof and the methods of its construction. Figure 1 is an interior view of the auditorium, while Figure 2 is a sectional view through the building, illustrating the method of supporting the glass roof, which embodies a peculiar adaptation of the Hayes System of Iron and Glass Roof. It is at the same time an arched ceiling and roof of glass, supported by seven pin-connected steel trusses, each weighing seventeen tons, which rest upon the walls above the glass work and are not seen from below. Another feature to which particular attention is directed is that no shadows are cast. From these trusses are suspended six-inch steel ribs, transversely to which are three-inch angle-iron purlins. Upon these are secured the immediate bearings for the glass, which are the guttered bars and horizontal framework so arranged that they permit the collection and discharge of all vapor or moisture which may condense upon the underside of the glass. The arrangement involves an intricate application of the system and embodies special features not before employed in glass-roof construction. The supporting trusses perform the dual function of sustaining the roof ceiling as described, and also of supporting the floor to the summer garden, which is to form one of the most attractive features of the building. The arrangement as embodied in this building was conceived by L. R. Mestaniz, a member of the Industrial Association. The structural iron-work was carried out by Charles O. Brown, Civil Engineer of the Riverside Bridge & Iron Works, Paterson, N. J., and the superstructure of glass by George Hayes, New York City.

GEORGE HAYES,
NEW YORK, N. Y.

STEAM VALVES.

NEW YORK, N. Y., July 8, 1893.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — WE have recently made great improvements in Jenkins Bros.' Valves, having adopted a new form of holding the disc-holder in place, having increased the number of bolts in valve bonnets, and have also increased the thickness of flanges, so that we offer to users, valves suitable for high steam-pressure. It is our intention to manufacture but one grade of valve, so that it will not be necessary for our customers to mention "Valves for high steam-pressure," as we shall place but one grade of valve on the market, and that suitable for any pressure.

We have made a most wonderful improvement in the manufacture of a rubber compound for use on high-pressure steam. For nearly two years we have been using and testing this rubber compound in the manufacture of Jenkins's Discs, and the results have been more than satisfactory. We have passed the experimental stage.

We take pleasure in offering to users and the trade, the improvements made in the manufacture of our goods, without any additional increase in selling price.

We consider the information regarding the rubber compound of great value to users of that class of goods, especially when you consider that a rubber compound can be successfully manufactured for use in valves on high temperature. It is the result of years' constant labor that has produced the result. It is the greatest advancement we have ever made in the manufacture of our specialties.

JENKINS BROS.,
NEW YORK, N. Y.

ASBESTOS BOILER COVERING.

NEW YORK, N. Y., July 19, 1893.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — WE take the following from a recent issue of *Iron Age*: —

"The new gunboat '*Machias*,' in her recent speed trial, accomplished the unprecedented feat of beating her guaranteed speed by nearly two and one-half knots, winning $45,000 premium for her builders."

The boilers, steam-pipes, etc., of this boat are covered with our Asbestos Fire-felt

Covering. A mention of this in your valuable columns may be of interest to your readers. Yours truly,

H. W. JOHNS MFG. CO.,
NEW YORK, N. Y.

U. S. MAIL CHUTE.

BY request of the Hon. Director-General of the World's Columbian Exposition, the Cutler Patent Mailing System, or U. S. Mail Chute, is to be seen in use in the four pavilions of the Administration Building, the Mail Boxes being of fine marble with real bronze trimmings, to show what can be done in the way of embellishment of an apparatus which is conceded to be one of the most useful of those now available in commercial buildings and hotels. We have also an exhibit showing what may be called "stock" or regular finish, in the gallery of the Liberal Arts Building, at Sec. E. U 108, and by request of the Post-office Department of the United States, another exhibit in the Government Building, near the World's Fair Post-office.

The attention of architects and others interested is called to these exhibits, as well as to more than 500 office-buildings and hotels equipped. Circulars giving full information on request.

CUTLER MFG. CO.,
ROCHESTER, N. Y.

P. O. DEPT., WASHINGTON, D. C.,
July 15, 1893.

Gentlemen: — Replying to your favor, it gives me great pleasure to comply with your request to express myself as to the value to the public and the postal service of the Cutler Patent Mailing System or the U. S. Mail Chute.

It seems to me that the strongest testimony that I can bear to the value of the system is simply to state that by its use in nearly five hundred buildings, averaging seven stories each, the mail deposited in thirty-five hundred mailing-openings is collected by the Department from only five hundred boxes. In this way the mail from office-buildings and hotels is collected with the smallest possible expense to the Government, and with a promptness and efficiency which, so far as I know, is not to be realized under any other plan. Very truly yours,

(Signed) WM. J. POLLOCK,
Sup't. Free Delivery System.

NOTES.

FOR a number of years Bardsley Bros., 147 to 151 Baxter Street, New York, have made a special study of the subject of automatic covers for freight elevator-shafts, and claim that they have solved a problem which has been a puzzle to manufacturers in that line. They have a considerable number of their improved devices in use in New York City, and some in other cities, and they are working satisfactorily, many of them under difficult conditions. In some cases there are only a few inches of space between the door and the wall, and it has not been necessary to cut the wall. In other cases the doors are very large and consequently heavy and in others the elevators travel at a high speed and in fact there seems to be no condition too difficult to meet. To interested parties the manufacturers will be pleased to give references, and any other information desired.

I. P. FRINK, 551 Pearl St., New York, makes a specialty of designing electric and other reflectors to order to secure the best distribution of light when the purposes and dimensions of a Hall, Church, Theatre or other large building are given. The reflectors manufactured by this house have been largely sold, not only in America, but abroad. Among recent buildings supplied are 35 prominent churches in various parts of the country; the Gallery of Fine-Arts, World's Fair, Chicago; the State-House at Columbus, Ohio; the Chicago Art Institute; Convention-Hall, Saratoga and other large buildings.

STEEL CEILINGS.

THE adjoining illustration is from a photograph of the Steel Ceiling lately placed in the

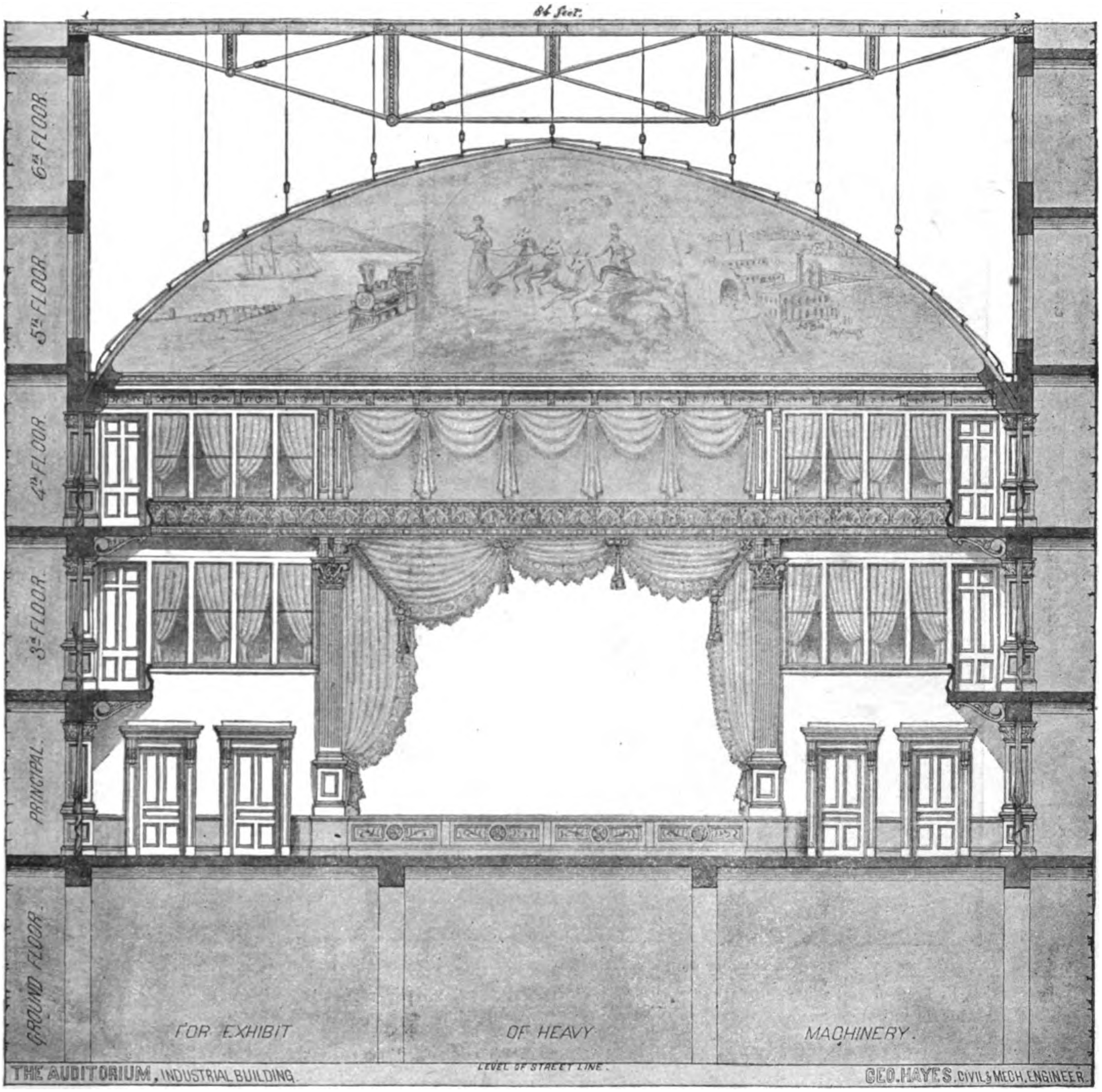


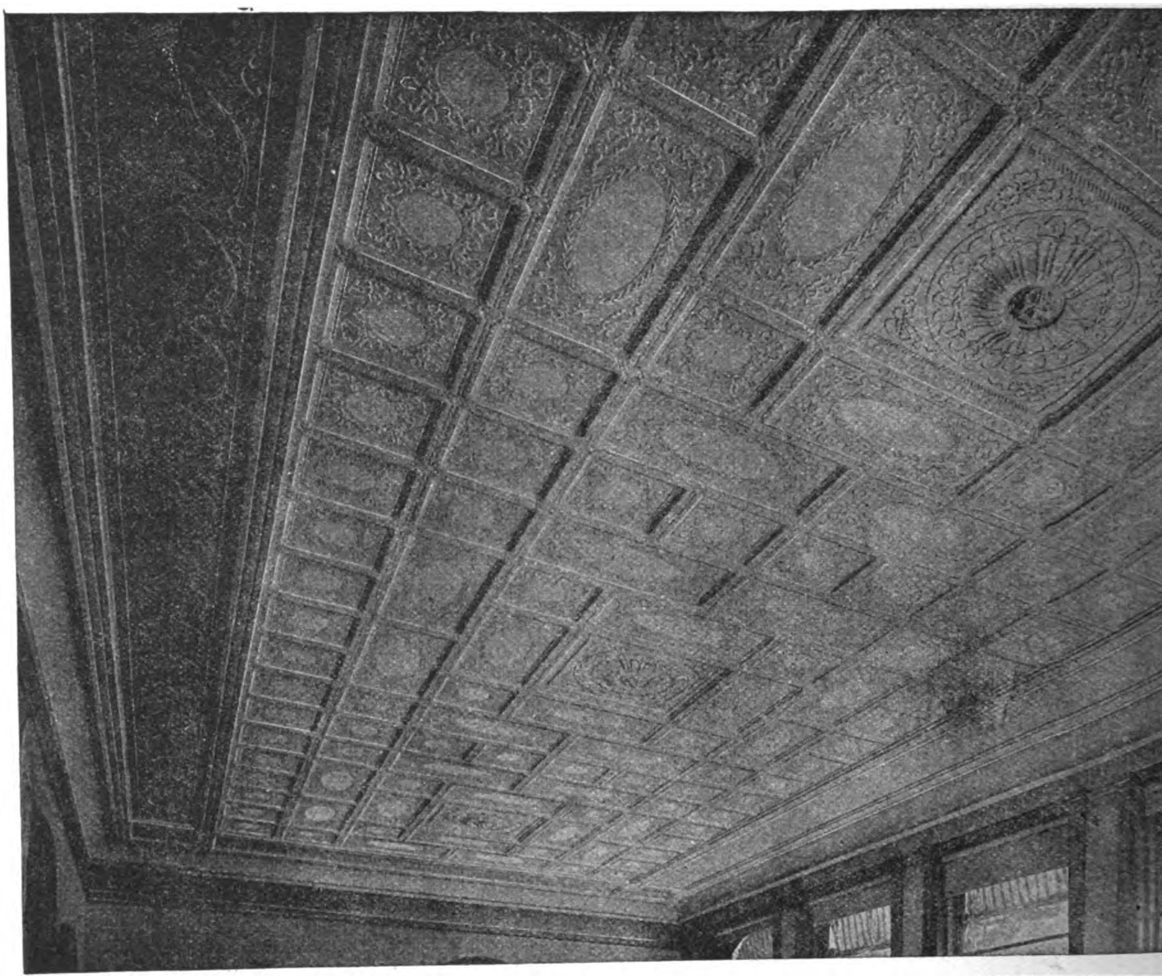
Fig. 2. Sectional View.

First National Bank at Paterson, N.J., by H. S. Northrop, Manufacturer of Stamped Ceilings at No. 30 Rose Street, New York. The various patterns of the Ceiling are of his "Empire Style." The panels are 2' x 2' and 2' x 4' and 1" deep. Mr. Northrop has the largest and best variety of panels with Borders, Cornices, etc., to suit, of any one in this rapidly growing business. He has recently established a branch office at No. 4 Liberty Square, Boston, and his agent there is fully employed.

H. S. NORTHROP,
NEW YORK, N. Y.

A WORK OF ART DESTROYED.

In the burning of the Hercules iron-works cold-storage building at the World's Fair a short time ago, the magnificent statue of Columbus, recently manufactured and owned by W. H. Mullins, at Salem, Ohio, was destroyed. This stood at the main entrance of the building, and in the excitement and heroic efforts by firemen and others to save human life, this beautiful work of art was forgotten and destroyed beyond any possibility of being restored to its former beauty. Although the statue was destroyed, we are glad to learn there are three others in existence made from the same model, one adorning the park at New Haven, Conn,, another in the grounds of an art school at Columbus, O., and the third at Phillipsburg, N. J.



Steel Ceiling in the First National Bank, Paterson, N. J. Manufactured by H. S. Northrop.

BUILDING INTELLIGENCE.

Reported for the American Architect & Building News.

HOUSES.

Boston, Mass.—*Josephine St.*, near Geneva Ave., Ward 24, frame dwell., 22.10' x 34'; owner, Mrs. H. Daucett; builder, G. H. Daucett.

Freeman St., near Faulkner St., Ward 24, frame dwell., 26' x 45'; owner, T. F. Mackie; builders, H. S. & N. Clark.

Columbia St., near Wales Pl., Ward 24, three-st'y frame dwell., flat roof, 23' x 51'; owner, A. L. Forbush; builders, McKay Bros.

Neponset Ave., near Boutwell St., Ward 24, frame dwell., 40' x 48'; owner, G. H. Frost; builder, T. H. Kingston.

(*Houses Continued.*)

Kelton St., near Wheatland Ave., Ward 24, frame dwell., 25' x 37'; owner, C. B. C. Manson; builder, W. A. Lent.

Boylston St., opp. A St., Ward 23, frame dwell., 37' x 41'; owner, I. C. Hersey; builder, J. P. Campbell.

Catawba St., near Laurel St., Ward 21, two frame dwells., 22' x 51.6'; owner, Nahum Wood; builder, W. T. Eaton.

Catawba St., *Nos.* 28-30, Ward 21, two frame dwells., 21' x 46'; owners, W. T. Eaton and S. H. Burns; builder, W. T. Eaton.

Harrishoff St., near Walnut Ave., Ward 21, frame dwell., 28.8' x 46.2'; owner, Joseph Stone; builders, Ourish & Rich.

Cobden St., near Washington St., Ward 21, three-st'y frame dwell., flat roof, 24' x 59'; owner, Lucy E. Brown, builder, John Brown.

Howe St., near Hancock St., Ward 24, frame dwell., 25.6' x 33.5'; owner, W. A. Spooner; builder, W. J. Jobling.

Townsend St., near Walnut Ave., Ward 21, frame dwell., 33' x 50'; owner, G. W. Gregory; builders, Ourish & Rich.

Albano St., near Birch St., Ward 23, frame dwell., 25' x 32'; owner, Joseph Fish; builder, B. J. Moxom.

Westville St., cor. Head St., Ward 24; frame dwell., 24' x 40'; owner, Mrs. M. J. Head; builder, M. McLaughlin.

West Eagle St., *No.* 55, Ward 1, frame dwell., hip roof, 21' x 47'; owner, W. Ross; builder, W. Goodwin.

Lawrence St., near Main St., Ward 5, three-st'y frame dwell., flat roof, 27' x 44'; owner, Hugh Lyons; builder, M. Welch.

Lawrence Ave., *Nos.* 28-30, Ward 24, two frame dwells., 28' x 44'; owner, William Phipps; builder, E. M. Chapman.

Bennington St., *No.* 216, Ward 1, three-st'y frame dwell., flat roof, 21.6' x 44'; owner, Mrs. R. E. Eton; builder, David Porter.

Cambridge St., opp. Saunders St., Ward 25, two frame dwells., 22.6' x 48'; owner and builder, James Mains.

Whitney St., *Nos.* 24-26, Ward 22, two frame dwells., 21' x 35'; owner, Ann Hynes; builder, W. J. O'Brien.

Cottageside St., off Cottage St., Ward 24, frame dwell., 22' x 50'; owner and builder, B. J. Moxom.

Alleghany St., *No.* 3, Ward 22, three-st'y frame dwell., flat roof, 23' x 42'; owner, R. W. Newton; builder, W. Ballantyne.

Gaston St., near Blue Hill Ave., Ward 21, frame dwell., 27' x 41'; owner, Peter Graffam; builders, Vaughn & Silver.

West Fifth St., *Nos.* 238-240, Ward 13, 2 three-st'y frame dwells., flat roofs, 20' x 44'; owners, Pierce Bros.; builder, W. T. Eaton.

Rockland St., near Peaceable St., Ward 25, four frame dwells., 19' x 46'; owner, H. E. Martin; builder, G. Wentworth.

Kennett Square, Pa.—Brick dwell.; owner, James Miles.

STORES.

Brooklyn, N. Y.—*Osborn St.*, e s, 225' n Blake Ave., three-st'y frame store and dwell., tin roof; cost, $6,000; owner, Morris Klinkenstein, East Broadway, New York City; architect, Louis Danancher, 31 Watkins St., Brooklyn.

Morgan Ave., w s, 50' n Harrison Pl., 3 three-st'y frame stores and dwells., tin roofs; cost, $4,800 each; owner, Henry Eppig, 350 Melrose St.; architect, Th. Engelhardt, 905 Broadway.

(*Stores Continued.*)

Ingraham St., n e, cor. Bogart St., three-st'y brick store and dwell., tin roof; cost, $8,000; owner, A. Rock, 89 Throop Ave.; architect, Frank Holmberg, 1169 Broadway.

Seventh Ave., w s, 25' n Thirteenth St., 3 four-st'y brick stores and dwells., tin roofs; cost, $7,000 each; owner and builder, A. G. Calder, 420 Eighth St.; architect, Wm. Calder, 371 Sixth St.

Myrtle Ave., n s, 80' 9" w Pearl St., five-st'y brick store and dwell., tin roof; cost, $12,000; owner, E. Zemmerli, 21 Myrtle Ave.; architect, C. F. Eisenach, 59 Court St.

New York, N. Y.—*West Broadway*, *No.* 54, five-st'y brick store, tin roof; cost, $10,000; owner, Thomas C. Oakley, 24 East Fifty-seventh St.; architect, Bruno W. Berger, 104-106 Bible House.

Clinton Pl., *No.* 16, four-st'y brick store, tin roof; cost, $12,000; owner, Washington H. Taylor, 14 Clinton Pl.; architect, Louis F. Heinecke, 62 Bowery St.

Bleecker St., *Nos.* 127-135, 2 seven-st'y brick stores, tin roof; cost, $150,000; owner, Louis M. Jones, 802 Lexington St.; architects, Cleverdon & Putzell, 13 Astor Pl.

Harrison St., s w cor. Staple St., two-st'y brick store, tin roof; cost, $120,000; owner, Joseph J. O'Donohue, 5 East Sixty-ninth St.; architect, Wm. Schickle, 246 Fifth Ave.

Hudson St., *Nos.* 77-79, six-st'y brick store, tin roof; cost, $10,000; owners, Welsh & Tweddle, 233 Greenwich St.; architects, M. & B. Ferdon, 265 West Thirty-fourth St.

TENEMENT-HOUSES.

Boston, Mass.—*Prince St.*, *No.* 89, Ward 7, four-st'y brick tenement, flat roof, 27' x 80; owners, H. & I. Romanow.

Wadsworth St., near Saratoga St., Ward 1, two-st'y frame tenement, flat roof, 20.6' x 30'; owner, Madelene Stevens; builder, G. C. Doyle.

New York, N. Y.—*Stebbins Ave.*, w s, 32' n One Hundred and Sixty-seventh St., 3 three-st'y brick tenements, tin roof; cost, $13,500; owner, F. F. Wilson, Stebbins Ave. and One Hundred and Sixty-seventh St.; architect, J. J. Vreeland, 711 East One Hundred and Seventy-seventh St.

One Hundred and Forty-eighth St., s s 94' w Courtland Ave., four-st'y brick tenement, tin roof; cost, $14,000; owner, Adolph Hank, 582 East One Hundred and Forty-eighth St.; architect, A. F. A. Shmitt, 604 Courtland St.

WAREHOUSES.

Brooklyn, N. Y.—*Flushing Ave.*, s w cor. Ryerson St., five-st'y brick storage warehouse, tin roofs; cost, $45,000; owner, Wm. B. A. Jurgens, Bushwick and Greene Aves.; architect, Th. Engelhardt, 905 Broadway.

Cincinnati, O.—H. Heile, four-st'y brick and stone warehouse, n e cor. Walnut St.; cost, $10,000; architect, Dan. Seger.

Eagle White Lead Co., three st'y brick and stone warehouse, s e Broadway; cost, $10,000; architect, Wm. Ruerbaugh.

MISCELLANEOUS.

Boston, Mass.—*Water St.*, near Keyes St., Ward 23, one-st'y brick valve house and one-st'y brick gasometer, 87.6' diameter; owners, Jamaica Plain Gaslight Co.; builders, Davis & Farnum.

Cambridge St., near Charles River, Ward 25, one-st'y brick generator-house, pitch roof, 63.4' x 99.4'; owners, Brookline Gaslight Co.

Mill St., near Webster St., Ward 2, one-st'y brick

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Is superior to any other Portland Cement made. It is very finely ground, always uniform and reliable, and of such extraordinary strength that it will permit the addition of 25 per cent more sand, etc., than other well-known brands, and produce the most durable work. It is therefore the most economical to use. 8,000 barrels have been used in the foundations of the Statue of Liberty. Architects and those interested in Portland Cement will please send for my pamphlet, which will be mailed free on application. It contains valuable directions for the employment of Portland Cement, a table of results of the strength of the Dyckerhoff Cement when mixed with sand and broken stone in various proportions, together with tests and testimonials of eminent Engineers, Architects and Consumers.

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SOLE AGENT FOR THE UNITED STATES.

BUILDING INTELLIGENCE.

(*Miscellaneous Continued.*)

storage, flat roof, 72' x 1113'; owners, National Dock and Storage Co.; builders, Flynt Building and Construction Co.

Brooklyn, N. Y. — *Vesta Ave.*, e s, 100' n Atlantic Ave., one-st'y frame coal pocket, gravel and felt roof; cost, $4,600; owners, Hatford & Ackerman, 2475 Atlantic Ave.; architects, The Construction Co., 1 Broadway, New York City.

Lexington Ave., s s, e Grand Ave., brick power-house, iron and wood roof; cost, $10,000; owner and architect, Edison Co., 360 Pearl St.

Camden, N. J. — *Federal and Fourth Sts.*, plans for a four-st'y stone and brick building, slate roof, for the Young Men's Christian Association; architects, Moses & King, 431 Walnut St.

Chicago, Ill. — A. Plamendon, elevator; 1259-1271 Harvard St.; cost, $20,000.

N. H. Purrell & Co., five-st'y elevator and malt-house; One Hundred and Twenty-third St., and South Park Ave.; cost, $20,000.

Frank Marshall, two-st'y elevator; Wabash R. R. and Forty-sixth St.; cost, $10,000.

Cincinnati, O. — Mary Holroyd Estate, brick and stone flower-market, Sixth St.; cost, $10,000; architects, Sam Hannaford & Sons.

Detroit, Mich.—Henry Carew & Co., brick brewery, Jefferson Ave.; cost, $20,000.

Elizabeth, Pa. — Brick building for the Alexian Brothers' Hospital.

Lancaster, Pa. — Brick and stone buildings for the Reformed Theological Seminary.

Madison, Pa. — Dormitory.

Milton, Pa. — *Broadway* cor. Front St., building.

New York, N. Y. — *Broadway, Nos.* 157-163, ten-st'y brick workshop, gravel roof; cost, $75,000; owner, S. Rawister & Co., 138 Duane St.; architects, Brunner & Tryon, 36 Union Square.

Fifty-sixth St., n s, 320' e Second Avenue, six-st'y brick workshop, tin roof; cost, $20,000; owner, T. Shriver & Co., 686 Park Ave.; architects, Rouirpe & Stever, 48 Exchange Pl.

Greenwich St., No. 807, five-st'y brick workshop, metal roof; cost, $20,000; owner, William H. Cowl, Garden City, L. I.; architects, Geo. B. Snook & Son, 126 Chamber St.

Cherry St., Nos. 229-231, seven-st'y brick workshop, tin roof; cost, $25,000; owners, Weil & Mager, 227 East Sixtieth St.; architects, Schneider & Herter, 48 Bible House.

Hester St., Nos. 127-131, seven-st'y brick light manufactory, tin roof; cost, $25,000; owner, M. O. Kauffman, 120 East Ninety-first St.; architect, Samuel Sass, 100 East Eighty-ninth St.

Ludlow St., No. 109, six-st'y brick workshop, tin roof; cost, $6,000; owner, Max Schwartz, 257 East Houston St.; architect, M. J. Schmalhouser, 63 Cook St., Brooklyn.

Philadelphia, Pa. — *Old York Road, No.* 3721, two-st'y brick cold-storage building; builder, Geo. Hance, 835 McGrath St.

Chester Ave., s s, w Forty-ninth St., three-st'y brick club-house; builders, Geo. F. Payne & Co., 401 South Juniper St.

Fifty-seventh St. and Chester Ave., one-st'y brick pavilion; builder, Louis Havens, 518 Girard Building.

Hanover St., Nos. 1129-31, two-st'y brick carpet-cleaning house; owner, Robert A. Eaton, 2217 Van Pelt St.

Wilson St., n s, w Centre St., two-st'y brick coach house; owner, Martin F. Connor, Centre and Wilson Sts.

Thirty-fifth St., w s, below Queen St., two-st'y brick building; owner, John Mohandle, Queen St. and Norristown R. R.

Richmond St., No. 2908, one-st'y brick ice-house; owner, C. Baret, 2810 Richmond St.

Sparks St., s s, w Ash St., two-st'y brick shop; builders, Koltner Bros., 2737 Ash St., Bridesburg.

Spruce and Thirty-fourth Sts., brick labratory; owner, Jacob Meyers, Locust St., s e cor. Thirteenth St.

Clearfield St., w s, e Twenty-second St., three-st'y brick storage house; builders, Wintz and Herman, 1618 North Twenty-seventh St.

Mt. Vernon St., n s, e s Thirteenth St., one-st'y power-house; builders, Samuel Hart & Sons, 1109 Fairmount Ave.

Chestnut St. above Third St., plans for granite building for the Bank of North America; architect, James H. Windrim, 1107 Walnut St.; builders, George Watson & Son.

Meadow St., w s, w Willow St., one-st'y brick mill; builder, Horace W. Castor, 4642 Frankford Ave.

Market and Tenth Sts., mercantile building for C. Harrison; architects, Cope & Stewardson, 316-20 Walnut St.

Spring Garden St., w s, w Twelfth St., two-st'y brick storehouse; builder, Allen B. Rorke, Drexel Building.

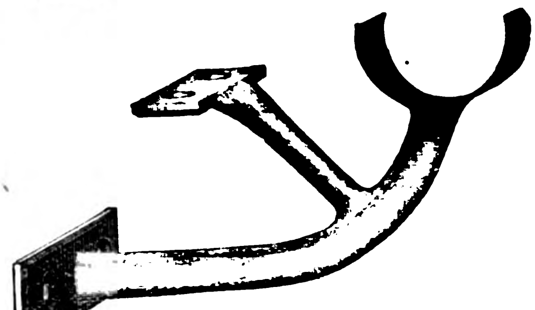
Reading, Pa. — *Spruce and Front Sts.*, one-st'y brick and iron storage house; owners, Bright & Lerch.

St. Louis, Mo. — Two-st'y dry-house, e s Lemp Ave., bet. Cherokee and Bank Sts.; cost, $9,000; owner and contractor, Wm. J. Lemp.

Orphan's Home, w s Aubert St., bet. Suburban Ry. and Fountain St.; cost, $15,000; owners, Christian Beneficial Association; contractor, A. A. Bartholomew.

One-st'y brick freight depot, Eighteenth St. and Clarke Ave.; cost, $14,000; owners and contractors, American Express Co.

BAR RAIL BRACKETS.



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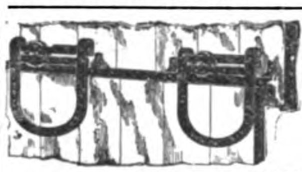

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THE AMERICAN ARCHITECT AND BUILDING NEWS

ADVERTISERS' TRADE SUPPLEMENT.

No. 135. SATURDAY, SEPTEMBER 2, 1893. VOLUME XLI. No. 923.

ANTINONNIN.

(ORTHODINITROCRESOLKALIUM.)

ESPECIAL attention is invited to the new product, Antinonnin, manufactured by the Farbenfabriken vorm. Friedr. Bayer & Co., Elberfeld, Germany.

Professors C. O. Harz and W. von Miller have published in the *München Allgemeine Zeitung*, No. 98, 1892, a highly interesting essay and report of their long-continued experiments on the extermination of that species of caterpillars (*Liparismonacha*) so destructive to forests and shade trees. They extended their experimentation to all chemicals known and commonly used as antiparasitics. All proved of no complete or permanent effect, except Orthodinitrocresolkalium (Antinonnin). This compound was first used in an aqueous solution of the strength of 1:400, but it was found that the intensity of the destructive action of the solution was very much increased by a slight addition of soap-solution. In this combination a solution containing but 1 part of Antinonnin in 1500 to 2000 parts of soap-water proved destructive to all common injurious parasites without any deleterious reaction on the plants. The result of these experiments therefore has established the fact that this new chemical product of the well-known "Farbenfabriken, vormals Bayer & Co. in Elberfeld" furnishes a safe and unfailing means for the protection of forest, shade and garden trees against the destructive action of plant-parasites of every kind, and may be used also as a means of impregnating or preserving wood or lumber against mildew, fungi, dry-rot, etc.

Further experiments have evinced the fact that a soap-solution of Antinonnin is not only one of the most powerful antiparasitics, but also an equally sure insecticide, destroying all kinds of insects on beasts and man, as for instance, lice, sarcoptes scabiei, and that it is therefore a remedy for all skin diseases caused by animal parasites. It furthermore has proved when applied as an ointment or wash, to be a reliable protection for horses, cows and all domestic animals, against flies, lice, mosquitoes and other annoying or injurious insect bites.

One of the most important results demonstrated by the comprehensive and thorough series of experimentation of Professors Harz and von Miller is that Antinonnin is the most potent agent for the destruction and prevention of the growth and propagation of fungi, mildew, dry-rot, etc., and all destructive and deleterious fungi in buildings and human habitations. It must be considered a most important and valuable addition to our *hygienic protectives*.

Fermentation and putrefaction, as is well known, are caused by lower kinds of fungi in the presence of moisture. Timber and all kinds of wood or plant-material employed in buildings are readily affected in damp ground and air by these lower plant-parasites. By the decomposition of the retained albuminous constituents of the wood-fibre, the wood itself undergoes a disintegration, obnoxious gases are evolved and the cellulose suffers in its structure and durability. Still more are such processes of putrefaction and destruction taking place in buildings and rooms subjected to dampness and uncleanliness, like close dwellings, water-closets, sinks, urinals, cellars, stables, etc. They are frequently the breeding places and pest-holes for infection to men and domestic animals and the origin of typhus, diphtheria, cholera and other malignant bacteriological diseases. Thorough disinfection and removal of the causes of infection are the only remedies and protection, and perfect cleanliness is the best preventive against dampness, fermentation and slow putrefaction of and in the woodwork, walls, wall-paper, furniture, etc., of rooms and houses. The first step to attain this is the destruction of fungi and all lower plant life which is the cause or the bearer of infection. In this respect Antinonnin surpasses all other antiseptics.

Another evil, destructive to beams and woodwork in buildings, is a species of fungi which in damp and dark places grows on woodwork and penetrates the cellular structure of wood so completely and is so destructive that the wood tissue is destroyed. Against these malignant fungi Antinonnin has also proved a prompt and sure remedy by simply applying to such woodwork a solution of 1 part Antinonnin in 200 parts of water.

Compared with other antiseptics and antiparasitics, like carbolic and phenolic compounds or derivatives, Antinonnin has the advantage not only of being more powerful in its action, but it is not volatile and is completely free from odor; and further, its use is safe and perfectly harmless in houses and living rooms. Its chemical formula is $C_6 H_2 (N O_2)_2 C H_2OK$. It was first used as a saffron yellow dye for coloring butter, candies, cakes, etc. Although not free of poisonous effect, its application for this purpose as well as an antiseptic, takes place in such a degree of dilution that no harm can result even in its use in food.

For practical reasons Antinonnin is intimately mixed with a very small addition of glycerine and soft soap so as to form a yellow paste.

For the destruction of mildew, wood-worms, dry-rot and the lower forms of insects, and as a preventative against mildew or dry-rot, a solution of 1 kilo (2 1-5 lbs.) Antinonnin in 300 litres (630 pints) water is the most effective concentration. The wood is saturated in the usual manner.

In regard to the application of Antinonnin for the protection of woodwork and walls in buildings, the following brief extracts may be noted. They are from the German Builder's Gazette: *Suddeutsche Bauzeitung*, No. 60, 1892.

Beams, boards and all kinds of wood used for buildings, for bridges, railroad beams, etc., are protected from rapid decay when impregnated with a solution of Antinonnin either by painting the well-seasoned or dry wood with the solution, or better, by immersing it in the solution for a few days.

For the disinfection of rooms, a one per cent or stronger solution of Antinonnin may be added to the paint (either water or oil paint) if the rooms are to be painted, or to the paste if paper-hangings are to be used.

Any woodwork to be placed under ground or in damp surroundings, like railroad-poles, telegraph-poles, beams for foundations, etc., may be protected for any length of time by previously impregnating them with a strong solution of Antinonnin.

On damp and mouldy walls in cellars, stables, factories, breweries and other structures and manufacturing buildings where cleanliness and immunity are requisite factors, the application of Antinonnin solution from time to time will be a sure protection against parasitical pollution and consequent moulding and putrefaction.

It may, therefore, safely be claimed that of all the known antiseptic and antizymotic products of modern synthetic chemistry, Antinonnin not only admits of the most general application, but is also the safest, the most effective and durable.

In regard to the use of Antinonnin in breweries, the following will be noted with interest:

WEISSBIER-BRAUEREI, M. SCHRAMM.

MUNICH, March 3, 1893.

FARBENFABRIKEN, VORM. FRIEDR. BAYER & CO., ELBERFELD: —

We take pleasure in communicating our experience with Antinonnin in our fermenting cellar and other cellars of our brewery. The walls and window recesses, which despite careful cleansing became covered with a thick, slimy layer of fungi — a circumstance to which

the elevated temperature of the fermentation method contributed — were treated with a solution of Antinonnin in water, of strength of 1 in 200. The application was repeated in two or three days and then lime water was applied. The effect of this proceeding was completely successful. Since we have employed Antinonnin the fungous deposits have disappeared, and if, after the lapse of several months a new formation of fungi takes place the repetition of the application is sufficient to arrest it for a long time. The places treated with Antinonnin remain dry for a long period — a result which we could not attain with the measures hitherto in use except for a few days.

(*Signed*) M. SCHRAMM,
Weissbier-Brauerei.

For prices, terms and other information concerning this valuable new preparation, apply to
W. H. SCHIEFFELIN & CO.,
NEW YORK, N. Y.

THE JACKSON HEAT-SAVING AND VENTILATING GRATE.

NEW YORK, N. Y., August 25, 1893.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs, — Thinking it might be of interest to others who need or use reports of the work their apparatus has done, we enclose proofs of Ohio reports of our ventilating grates. Our system is to make a separate issue of each State — giving the reports of the characteristic work we are doing there — naming also each city or town in which our grates are used. Thus in New York over 130 places are mentioned. This scheme of separating States is of advantage to the reader, in simplifying — and to the manufacturer in saving waste printing.

We send Ohio only, because it is most recently printed.

We are very truly yours,
EDWIN A. JACKSON & BROTHER,
NEW YORK, N. Y.

AKRON, March 4, 1884.

Arthur Latham (the Whitman & Barnes Man'f'g Co.). — As a heater it is all that you claim for it, and its ventilating qualities are perfect.

ALLIANCE, February 12, 1886.

J. T. Weybrecht (Manufacturer of doors, sashes and blinds). — Two of the grates are located on the north side of the house, in a large double room, with bay-window facing north and west. We have had no difficulty whatever in heating these rooms, together with the chambers above, and this when the thermometer registered 10° below zero. We have no other mode of ventilation than by your grate, which we consider its most valuable feature. We burn soft coal and occasionally a large stick of green beech.

BRIDGEPORT, February 14, 1885.

Thos. T. Frasier. — I use soft coal, and the grate keeps my room comfortable when the thermometer has been 5° below zero out-doors. In all ordinary winter weather it also heats pleasantly the room above. As to ventilation, I would not exchange our room for any in the neighborhood.

CHILLICOTHE, March 19, 1889.

W. E. Ford (Wm. Taylor & Co.). — The room in which the grate is set is heated luxuriously; one room above is heated comfortably. The grate and fender are rich and handsome — all is entirely satisfactory.

CINCINNATI, November 13, 1886.

E. Cort Williams, Esq. (Attorney-at-law). — The grate does its work with eminent satisfaction. The workmen had no trouble in setting the grate, and we find the surplus heat sufficient to thoroughly warm a large bath-room, with a northwest exposure, above, while below it warms a large dining-room, and adds to its beauty by its handsome open fire-place, with no suggestion of a stove in its appearance, which made the Baltimore heater such an abomination.

CLEVELAND, April 7, 1883.

Joseph Perkins (Chairman Ohio State Board of Charities). — The ventilating grates which we purchased of you for the hospital and nursery of the Retreat and the children's room of the day-nursery have been used sufficiently to convince us that they are powerful heaters and admirable ventilators. I an satisfied they are the best grate, where heat and change of air are desired, that I ever saw used.

EAST LIVERPOOL, March 19, 1888.

H. S. Goodwin (Goodwin Brothers, Manufactures of Pearl White and C. C. Ware). — We use the Oliver pattern of the Jackson Ventilating Grate, heating four rooms with two grates. The space heated aggregates 14,000 feet; the fuel used is natural gas, and no trouble is experienced even in the coldest weather; we know of no grate which equals this. We could not be persuaded to re-adopt the ordinary mode of heating, for the fresh warm air constantly flowing into our chambers brings health to our household, and is thus invaluable.

EATON, February 11, 1887.

A. C. Risinger (Attorney-at-Law). — We heat with one grate, a fair-sized parlor, a small library, and a bedroom down-stairs (the bedroom being heated to a nice degree for dressing and sleeping), and this with an ordinary fire and in *cold* weather. It is also arranged to heat either of two chambers up-stairs, and this it does comfortably for sleeping purposes. As a ventilator it supplies our rooms with fresh, pure air, that there is no need to bother with windows for ventilation.

EATON, February 6, 1888.

Mrs. E. A. Mehaney. — With the grate I heat my parlor, 15' x 20', and a chamber over it, 15' x 17'. The door is kept open from the parlor to an adjoining sitting-room, 15' x 15', and adjoining the latter is my dining-room, 18 feet square. The parlor and the dining-room have good-sized bay-windows. In the dining-room I have an anthracite coal stove. These two fires keep the rooms comfortable in the coldest weather. The rooms are 11 feet high.

EATON, February 16, 1888.

Chas. R. Hunter (Builder and Contractor). — The grate I purchased of you is heating four rooms, three on the first floor, which are connected by folding doors, and a room up-stairs. A register also opens into a hall above which it supplies with a comfortable heat. It is superior to any grate I have ever seen.

MANSFIELD, March 1, 1884.

John Hursh. — The room in which it is set is 15' x 17'; height of story, 9½ feet. The room has three windows, three single and two folding doors. We had no trouble in heating this room during the coldest weather with about the same amount of fuel as a stove requires. The ventilation is perfect.

MANSFIELD, March 5, 1883.

John M. Jolly (of H. M. Weaver & Co.). — I find it an excellent grate for heating and ventilation. Heats a sitting-room 15' x 17', and in all ordinary weather a bed-chamber over it 14' x 16'.

MARIETTA, February 4, 1888.

Rev. J. R. Barnes. — It heats two rooms on the same floor, one 15' x 15', the other 12' x 15'. We burn one and one-half hods of soft coal — in zero, two hods. It gives pure air day and night.

MASSILLON, February 6, 1885.

James Bayliss. — We warm only one room, 16' x 17', but it does it better than anything we have ever used before, and we can easily make it too warm in the coldest weather, and could if the room was much larger. We have had very cold weather (24° below zero). The ventilation is complete.

NORWALK, March 27, 1885.

S. W. Owen. — We have one in our family room, 18' x 20', and exposed on three sides, which it thoroughly heats and ventilates, and comfortably warms also a bath-room 8' x 12'. The second grate is used in the parlor, and it also is a perfect success.

OBERLIN, April 12, 1883.

Prof. Wm. G. Frost (Oberlin College). — We have burned hard coal and warmed a good-sized sitting-room constantly, heating a bedroom back of the grate whenever we wished, and warming a parlor separated from the sitting-room by folding-doors frequently. It certainly saves a great deal of fuel. What we enjoy the most is the ventilation by means of pure warm air.

ORRVILLE, 1891.

Isaac Pontius (Coal). — The grate heats parlor 12' x 15', and a bedroom 12' x 12', and when needed, also a room on second floor. The ventilation is perfect.

QUAKER CITY.

W. V. Webster. — Your grate heats two rooms, one up-stairs, one down, each 14' x 15'. We use soft coal, and the grate uses much less fuel, and does much better work than the heating apparatus we had before.

SALEM, February 20, 1884.

G. N. Caruthers (Supt. Public Schools). — I used two the present winter. My house is new and rooms of good size and height. We have lived very comfortably through this terrible weather without any other heater of any kind, except the kitchen range. The air has been pure, fresh, abundant and warm. The honest workmanship would commend them to any one who saw the grates.

SALEM, April 10, 1884.

C. Walter Brian (Brian Bros.). — We successfully heat a living-room, 18' x 15' and a bath-room back of it with the ventilating grate.

SPRINGFIELD, March 24, 1886.

J. B. Korn. — The ventilating grate that I bought of you last year gave entire satisfaction the past winter in heating and ventilating two rooms — sitting-room, 15' x 18' x 10' on first floor, and bedroom on second floor, 15' x 15' x 9'. It made them comfortable when the temperature outside was 10° to 12° below zero.

SPRINGFIELD.

Hon. J. Warren Keifer. — The grate heats a room 21' x 15', also a room the same size over it. We use wood and soft coal, and shall soon use natural gas.

WARREN, March 9, 1885.

Homer E. Stewart. — Your ventilating grate in my library, 15' x 18', with bay-window is ample for the purpose, using our native "Block" or "Briar Hill" coal. Had previously an ordinary grate of same size, but could not keep warm, no matter how much coal was used.

WASHINGTON C. H., March 11, 1889.

C. R. Parrett. — We heat with the grate three rooms — one on the first floor 13' x 18', and two on the second floor 13' x 15' and 13' x 13'.

YOUNGSTOWN, November 4, 1889.

Frank G. Schafer & Co. — One grate is heating four rooms. It is the most perfect we have ever seen.

ZANESVILLE, February 14, 1893.

Howard Aston. — The grate heats a sitting-room in weather 15° below zero, and also one room up-stairs. We heat three rooms up-stairs in milder weather. The ventilation is splendid.

The grates are also used in Cadiz, Conneant, Carrollton, Clarksville, Columbus, Dayton, Glendale, Greenfield, Hamilton, Hicksville, Hiram, Holmesville, Kenton, Loveland, Leipsic, Marysville, Martin's Ferry, Middle Bass Island, Mount Vernon, Painesville, Put-in-Bay, St. Mary's, St. Clairsville, Seven Mile, Short Creek, Tiffin, Van Wert, Waynesville, Wellington, Wooster, Xenia.

EDWIN A. JACKSON & BRO.,
NEW YORK, N. Y.

I. P. FRINK finds that collections are pretty slow, but he can report the usual run of orders, having received this month a large number of export orders, reaching to India, China, Africa, Central and South America.

A WORD ON WHITE LEAD.

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Kerlin St., church for the Holy Trinity Lutheran Church; builders, B. D. Ayers & Son.

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Hope St., e s, two-and-one-half-st'y frame dwell.; owner, Henry Carpenter.
Main St., s Woodlawn St., two-st'y frame dwell.; owner, George Helme.
Cooper St., s Woodlawn St., two-and-one-half-st'y frame dwell.; owners, Ralph and Mary Jewett.

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Frame dwell.; owner, Mrs. J. W. Hetzel; architect, Elmer F. Miller.
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Marcus Hook, Pa. — Hall building; Building Committee of Council.

Philadelphia, Pa. — *Chester Ave.*, n s, e Forty-seventh St., three-st'y brick bakery; owner, David Schock, 1232 South Eighth St.

Worcester, Mass. — *Webster St.*, two-st'y brick engine house; owners, City of Worcester; contractor, E. Belisle; architects, E. Boyden & Son.

the elevated temperature of the fermentation method contributed — were treated with a solution of Antinonnin in water, of strength of 1 in 200. The application was repeated in two or three days and then lime water was applied. The effect of this proceeding was completely successful. Since we have employed Antinonnin the fungous deposits have disappeared, and if, after the lapse of several months a new formation of fungi takes place the repetition of the application is sufficient to arrest it for a long time. The places treated with Antinonnin remain dry for a long period — a result which we could not attain with the measures hitherto in use except for a few days.

(*Signed*) M. SCHRAMM,
Weissbier-Brauerei.

For prices, terms and other information concerning this valuable new preparation, apply to
W. H. SCHIEFFELIN & CO.,
NEW YORK, N. Y.

THE JACKSON HEAT-SAVING AND VENTILATING GRATE.

NEW YORK, N. Y., August 25, 1893.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Thinking it might be of interest to others who need or use reports of the work their apparatus has done, we enclose proofs of Ohio reports of our ventilating grates. Our system is to make a separate issue of each State — giving the reports of the characteristic work we are doing there — naming also each city or town in which our grates are used. Thus in New York over 130 places are mentioned. This scheme of separating States is of advantage to the reader, in simplifying — and to the manufacturer in saving waste printing.

We send Ohio only, because it is most recently printed.

We are very truly yours,
EDWIN A. JACKSON & BROTHER,
NEW YORK, N. Y.

AKRON, March 4, 1884.

Arthur Latham (the Whitman & Barnes Man'f'g Co.). — As a heater it is all that you claim for it, and its ventilating qualities are perfect.

ALLIANCE, February 12, 1886.

J. T. Weybrecht (Manufacturer of doors, sashes and blinds). — Two of the grates are located on the north side of the house, in a large double room, with bay-window facing north and west. We have had no difficulty whatever in heating these rooms, together with the chambers above, and this when the thermometer registered 10° below zero. We have no other mode of ventilation than by your grate, which we consider its most valuable feature. We burn soft coal and occasionally a large stick of green beech.

BRIDGEPORT, February 14, 1885.

Thos. T. Frasier. — I use soft coal, and the grate keeps my room comfortable when the thermometer has been 5° below zero out-doors. In all ordinary winter weather it also heats pleasantly the room above. As to ventilation, I would not exchange our room for any in the neighborhood.

CHILLICOTHE, March 19, 1889.

W. E. Ford (Wm. Taylor & Co.). — The room in which the grate is set is heated luxuriously; one room above is heated comfortably. The grate and fender are rich and handsome — all is entirely satisfactory.

CINCINNATI, November 13, 1886.

E. Cort Williams, Esq. (Attorney-at-law). — The grate does its work with eminent satisfaction. The workmen had no trouble in setting the grate, and we find the surplus heat sufficient to thoroughly warm a large bath-room, with a northwest exposure, above, while below it warms a large dining-room, and adds to its beauty by its handsome open fire-place, with no suggestion of a stove in its appearance, which made the Baltimore heater such an abomination.

CLEVELAND, April 7, 1883.

Joseph Perkins (Chairman Ohio State Board of Charities). — The ventilating grates which we purchased of you for the hospital and nursery of the Retreat and the children's room of the day-nursery have been used sufficiently to convince us that they are powerful heaters and admirable ventilators. I an satisfied they are the best grate, where heat and change of air are desired, that I ever saw used.

EAST LIVERPOOL, March 19, 1888.

H. S. Goodwin (Goodwin Brothers, Manufactures of Pearl White and C. C. Ware). — We use the Oliver pattern of the Jackson Ventilating Grate, heating four rooms with two grates. The space heated aggregates 14,000 feet; the fuel used is natural gas, and no trouble is experienced even in the coldest weather; we know of no grate which equals this. We could not be persuaded to re-adopt the ordinary mode of heating, for the fresh warm air constantly flowing into our chambers brings health to our household, and is thus invaluable.

EATON, February 11, 1887.

A. C. Risinger (Attorney-at-Law). — We heat with one grate, a fair-sized parlor, a small library, and a bedroom down-stairs (the bedroom being heated to a nice degree for dressing and sleeping), and this with an ordinary fire and in *cold* weather. It is also arranged to heat either of two chambers up-stairs, and this it does comfortably for sleeping purposes. As a ventilator it supplies our rooms with fresh, pure air, that there is no need to bother with windows for ventilation.

EATON, February 6, 1888.

Mrs. E. A. Mehaney. — With the grate I heat my parlor, 15′ x 20′, and a chamber over it, 15′ x 17′. The door is kept open from the parlor to an adjoining sitting-room, 15′ x 15′, and adjoining the latter is my dining-room, 18 feet square. The parlor and the dining-room have good-sized bay-windows. In the dining-room I have an anthracite coal stove. These two fires keep the rooms comfortable in the coldest weather. The rooms are 11 feet high.

EATON, February 16, 1888.

Chas. R. Hunter (Builder and Contractor). — The grate I purchased of you is heating four rooms, three on the first floor, which are connected by folding doors, and a room up-stairs. A register also opens into a hall above which it supplies with a comfortable heat. It is superior to any grate I have ever seen.

MANSFIELD, March 1, 1884.

John Hursh. — The room in which it is set is 15′ x 17′; height of story, 9½ feet. The room has three windows, three single and two folding doors. We had no trouble in heating this room during the coldest weather with about the same amount of fuel as a stove requires. The ventilation is perfect.

MANSFIELD, March 5, 1883.

John M. Jolly (of H. M. Weaver & Co.). — I find it an excellent grate for heating and ventilation. Heats a sitting-room 15′ x 17′, and in all ordinary weather a bed-chamber over it 14′ x 16′.

MARIETTA, February 4, 1888.

Rev. J. R. Barnes. — It heats two rooms on the same floor, one 15′ x 15′, the other 12′ x 15′. We burn one and one-half hods of soft coal — in zero, two hods. It gives pure air day and night.

MASSILLON, February 6, 1885.

James Bayliss. — We warm only one room, 16′ x 17′, but it does it better than anything we have ever used before, and we can easily make it too warm in the coldest weather, and could if the room was much larger. We have had very cold weather (24° below zero). The ventilation is complete.

NORWALK, March 27, 1885.

S. W. Owen. — We have one in our family room, 18′ x 20′, and exposed on three sides, which it thoroughly heats and ventilates, and comfortably warms also a bath-room 8′ x 12′. The second grate is used in the parlor, and it also is a perfect success.

OBERLIN, April 12, 1883.

Prof. Wm. G. Frost (Oberlin College). — We have burned hard coal and warmed a good-sized sitting-room constantly, heating a bedroom back of the grate whenever we wished, and warming a parlor separated from the sitting-room by folding-doors frequently. It certainly saves a great deal of fuel. What we enjoy the most is the ventilation by means of pure warm air.

ORRVILLE, 1891.

Isaac Pontius (Coal). — The grate heats parlor 12′ x 15′, and a bedroom 12′ x 12′, and when needed, also a room on second floor. The ventilation is perfect.

QUAKER CITY.

W. V. Webster. — Your grate heats two rooms, one up-stairs, one down, each 14′ x 15′. We use soft coal, and the grate uses much less fuel, and does much better work than the heating apparatus we had before.

SALEM, February 20, 1884.

G. N. Caruthers (Supt. Public Schools). — I used two the present winter. My house is new and rooms of good size and height. We have lived very comfortably through this terrible weather without any other heater of any kind, except the kitchen range. The air has been pure, fresh, abundant and warm. The honest workmanship would commend them to any one who saw the grates.

SALEM, April 10, 1884.

C. Walter Brian (Brian Bros.). — We successfully heat a living-room, 18′ x 15′ and a bath-room back of it with the ventilating grate.

SPRINGFIELD, March 24, 1886.

J. B. Korn. — The ventilating grate that I bought of you last year gave entire satisfaction the past winter in heating and ventilating two rooms — sitting-room, 15′ x 18′ x 10′ on first floor, and bedroom on second floor, 15′ x 15′ x 9′. It made them comfortable when the temperature outside was 10° to 12° below zero.

SPRINGFIELD.

Hon. J. Warren Keifer. — The grate heats a room 21′ x 15′, also a room the same size over it. We use wood and soft coal, and shall soon use natural gas.

WARREN, March 9, 1885.

Homer E. Stewart. — Your ventilating grate in my library, 15′ x 18′, with bay-window is ample for the purpose, using our native "Block" or "Briar Hill" coal. Had previously an ordinary grate of same size, but could not keep warm, no matter how much coal was used.

WASHINGTON C. H., March 11, 1889.

C. R. Parrett. — We heat with the grate three rooms — one on the first floor 13′ x 18′, and two on the second floor 13′ x 15′ and 13′ x 13′.

YOUNGSTOWN, November 4, 1889.

Frank G. Schafer & Co. — One grate is heating four rooms. It is the most perfect we have ever seen.

ZANESVILLE, February 14, 1893.

Howard Aston. — The grate heats a sitting-room in weather 15° below zero, and also one room up-stairs. We heat three rooms up-stairs in milder weather. The ventilation is splendid.

The grates are also used in Cadiz, Conneaut, Carrollton, Clarksville, Columbus, Dayton, Glendale, Greenfield, Hamilton, Hicksville, Hiram, Holmesville, Kenton, Loveland, Leipsic, Marysville, Martin's Ferry, Middle Bass Island, Mount Vernon, Painesville, Put-in-Bay, St. Mary's, St. Clairsville, Seven Mile, Short Creek, Tiffin, Van Wert, Waynesville, Wellington, Wooster, Xenia.

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THE AMERICAN ARCHITECT AND BUILDING NEWS

ADVERTISERS' TRADE SUPPLEMENT.

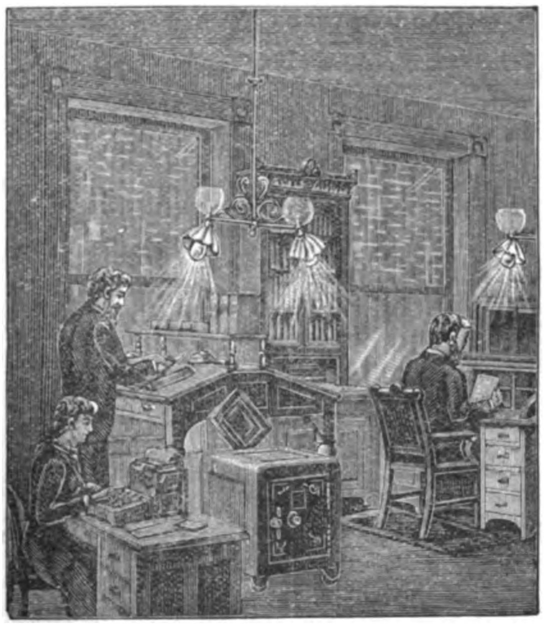
No. 136. SATURDAY, OCTOBER 7, 1893. VOLUME XLII. No. 928.

FRINK'S PATENT DAYLIGHT REFLECTORS.

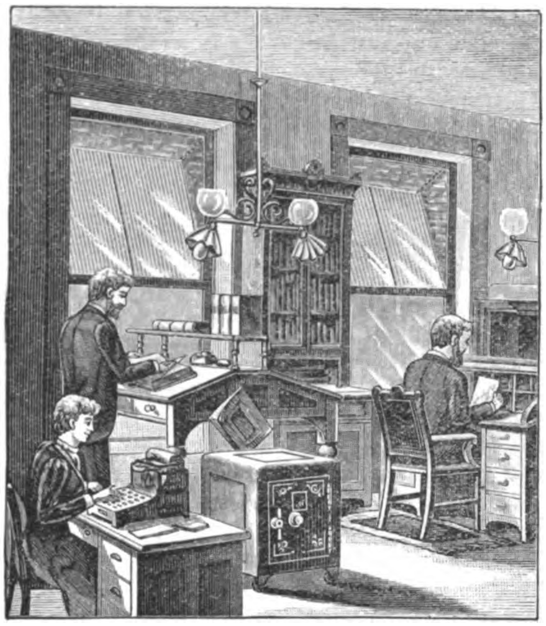
A WELL-KNOWN architect said the other day that if buildings were constructed in the future as they have been in the past, and are at present, a great many brokers and merchants would soon lose their eye-sight. This remark was occasioned by the architect having noticed a large building in which the air-shaft was a much more conspicuous feature than the windows. There is, however, an invention known as Frink's Patent Daylight Reflector, which will be found of inestimable service to those who are forced to occupy offices where gas or electric lamps are now required in the daytime. Every one knows how many dark rooms there are, even in the best planned apartment-houses, but these dismal places of abode may all be satisfactorily illumined by means of the Frink reflector. It is placed at the very angle which will reflect the rays of light where most required. It is not a coarse, blinding light which is thus obtained, but a mellow, well and evenly diffused light, soft and agreeable to the eye, and so nearly like the natural light that the difference is hardly perceptible. It presents a silver-plated corrugated glass surface to the atmosphere, which is protected against the wearing influence of the latter by a chemical preparation.

Estimates and information will be cheerfully furnished upon application to

I. P. FRINK,
551 PEARL STREET, NEW YORK, N. Y.



An Office Lighted by Gas and Electricity.



Same Office Lighted by Frink's Daylight Reflectors.

ELEVATORS AND THEIR LATEST IMPROVEMENTS.

THE steady progress of improvement in the construction of high-speed safety passenger elevators has created such universal interest and comment that we have no doubt that the new catalogue which has just been issued by The Graves Elevator Co., of Rochester, N. Y., will be of value to every architect or builder contemplating their use.

This catalogue is up to date in every particular, illustrating and describing almost every description of elevator, and many new devices for speed, safety and economy.

The several systems described are as follows: hydraulic, electric and steel-screw passenger and freight elevators, also the patent spur-gear freight-elevator.

In the last pages of the catalogue is published a list of over twenty-six hundred actual users of The Graves Elevators, comprising hundreds of the best business houses, hotels and office-buildings in the country.

The Graves Elevators have been in use since 1875. Very limited at first, of late years the sales have increased so rapidly that they are constantly making additions to their already large plant, having just finished a substantial five-story building 60′ x 100′ to be used for building cars.

Those about to purchase an elevator should send for one of these catalogues to

THE GRAVES ELEVATOR COMPANY,
ROCHESTER, N. Y.

GORTON BOILERS IN DEMAND.

IT is pleasing in these days of general trade dulness to report an instance of genuine prosperity and increased business, such as is recorded of the Gorton & Lidgerwood Company, 96 Liberty Street, New York City. This enterprising concern, the sole manufacturer of the famous Gorton house-heating boilers, states that its order-book shows an increase of sales from January 1st to September 1st, current year, of 30% over the same eight months of 1892.

The company says by way of explanation, "The merit of the boilers did it. There is no doubt about that. We have made no unusual effort to attract business."

There is evidently no limit to the degree of popularity which the Gorton boilers may attain. They are largely used by the U. S. Government and wherever strictly high-class heating apparatus is desired.

GORTON & LIDGERWOOD COMPANY,
96 LIBERTY STREET, NEW YORK, N. Y.

AN ECONOMICAL SUBSTITUTE FOR BACK-PLASTER.

"SHEATHING Quilt" is the name of a newly patented material to be used in place of back-plaster or common sheathing-papers for the protection of houses from heat and cold, and also for the deadening of sound between floors and in partitions. It is composed of a tough saline grass held in place between two layers of manilla paper by quilting. The grass is

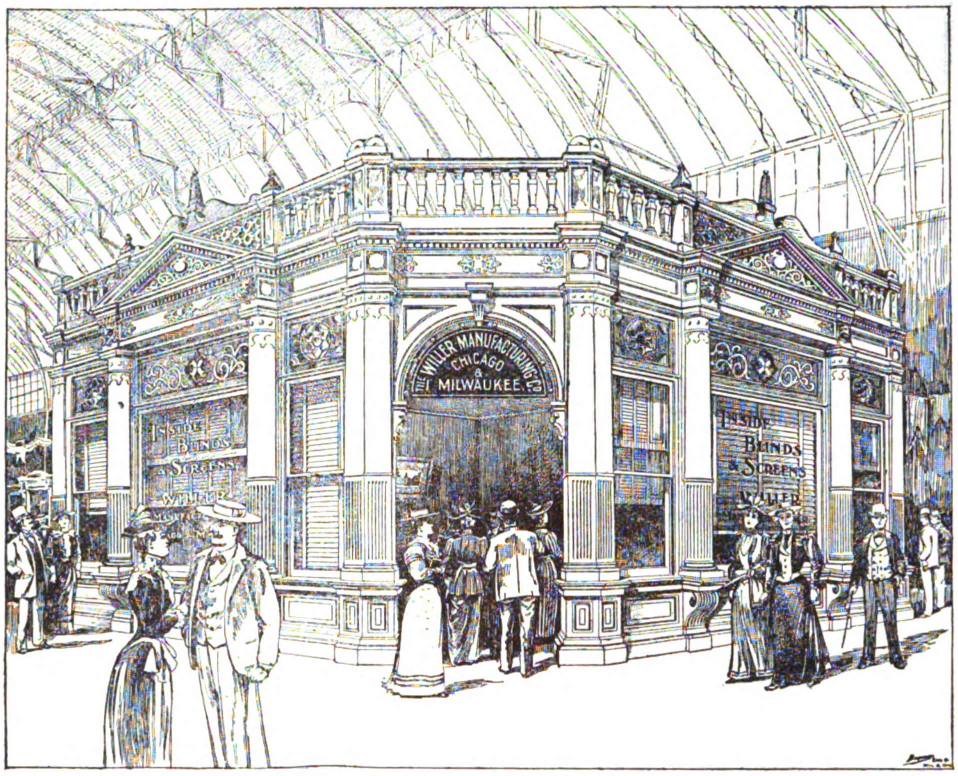
antiseptic in its nature. The quilt is much less inflammable than ordinary sheathing papers, as it contains silicon in place of their carbon.

It is guaranteed to be a warmer covering than back-plaster and it is less than half as expensive as that method.

It is adapted not only to the lining of dwellings for the exclusion of heat and cold, but for use in cold-storage warehouses, ice-chests, cold-closets, or in any structure which it is desired to protect from the variations of temperature; also as a sound deadener in all kinds of buildings, its great elasticity making it admirably suited for this purpose. Samples will be furnished on application, by the manufacturer.

SAMUEL CABOT,
70 Kilby St., Boston, Mass.

THE WILLER MANUFACTURING COMPANY'S EXHIBIT AT THE WORLD'S FAIR.



The Willer Pavillion at the World s Fair.

We present herewith an illustration of an exhibit at the World's Fair by the Willer Manufacturing Company of Milwaukee, Wis. and Chicago, Ill. This company is thoroughly well known all over the country as the manufacturers and producers of the Willer sliding-blind, the first sliding-blind put on the market possessing any real merit and meeting the demands of a discriminating public. Since then a number of other manufacturers have brought out sliding-blinds and copied the principal meritorious features of the Willer blind and printed publications and illustrations of the company to an extent bordering on and in some cases actually constituting depredation and piracy and claiming to produce blinds equal and superior to any other: none of these, however, have reached the high standard for quality and merit attained by this company.

The sliding-blind is the principal specialty produced by this company and it is brought out by them in a variety of grades, finishes, etc., to suit the tastes and requirements of the wealthy and extravagant as well as the financially less fortunate or more economical builders of houses.

Besides the sliding-blind, the company has for years produced the old standard folding-blind and a special folding-blind of their own, as well as custom-made screen-doors, sliding and stationary screens for all classes of buildings. They have lately also added a Venetian-blind department to their business and are producing the blind in a variety of styles: the English Venetian-blind as well as a new sliding Venetian-blind, which latter blind is not drawn up by cords but operates the same as a sliding-blind, being balanced by springs or weights or by both and remaining in any desired position in the window.

All of the company's various products are shown in a well designed pavilion, located on the gallery in the north end of the Manufactures and Liberal Arts Building, which every body, especially the architects, builders and contractors of the country, who may visit the World's Fair are cordially invited to examine.

The company's factory and home office is in Milwaukee, Wis. and their branch office at Chicago is Room 25, Adams Express Building, 183 and 185 Dearborn St.

WILLER MFG. CO.,
Milwaukee, Wis.

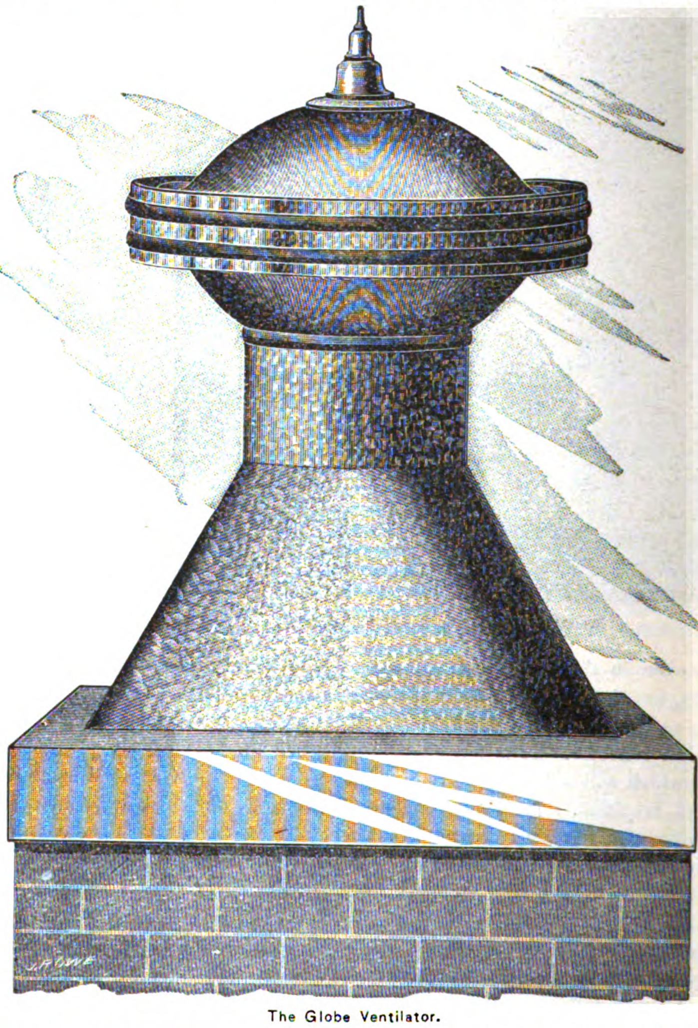
THE GLOBE VENTILATOR.

The Globe Ventilator is coming into more general and constant use as the years go by. The merit of this ventilator is becoming more and more recognized and it is being rewarded with a larger and more extended patronage than ever before.

The manufacturers of the Globe profiting by the experiences of others, have produced a ventilator which answers all purposes required for purifying the air of the factory or the auditorum and renders both the home and the school healthful and comfortable.

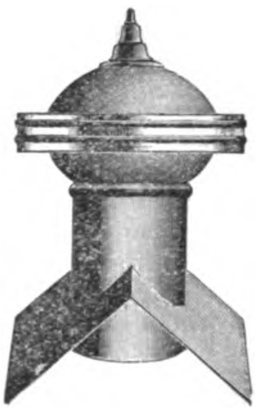
Many of the largest manufacturing concerns have adopted this system of ventilation for their plants with great satisfaction to themselves, as all odors, gases, steam and excessive heat are exhausted from the work-rooms, thus enabling the toilers to render better and more efficient as well as more profitable service.

Unquestionably the subject of ventilation is receiving more careful and serious attention than ever before. It is coming to be regarded as a necessity by the owners of all buildings designed for the use of human beings or for animals as well. One of the things that the proprietor of an opera-house, who relies upon the patronage of the public for his revenue, cannot afford to economize on is ventilation, when such economy means inferiority. For the people who patronize our theatres are not attracted by the beauty and large cost of their internal decorations — but go where they can see a good performance amid comfortable surroundings.



The Globe Ventilator.

Still how often do we find architects and builders who, while spending fabulous sums in frescoing and drapery, stint the more important and profitable matter of ventilation!



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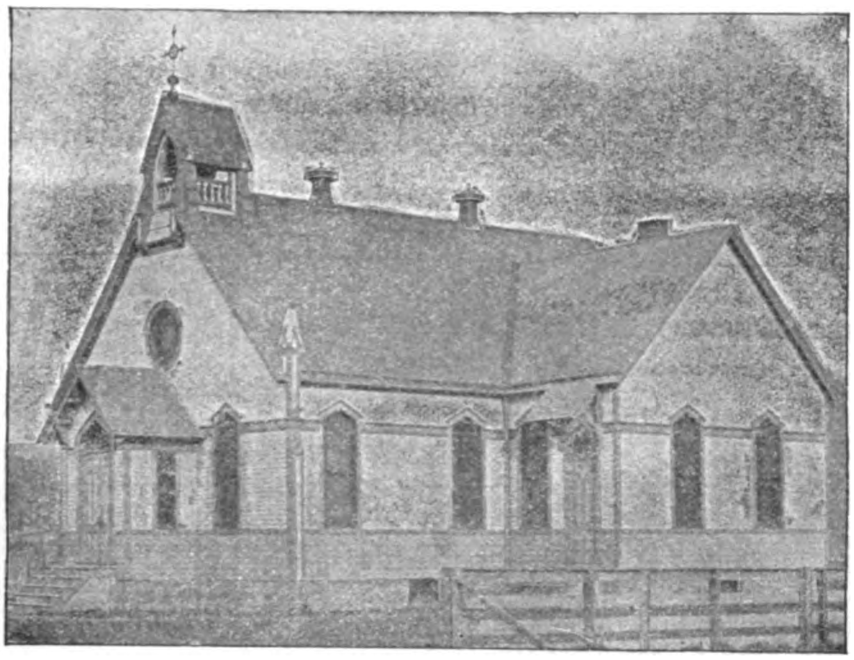
203 River Street, Troy, N. Y.



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Linwood, Del. Co., Pa., September 15, 1893.

E. W. Humphries, Esq., care Messrs. Harrison Bros. & Co., Philadelphia.

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NOTES.

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SAMSON CORDAGE WORKS,
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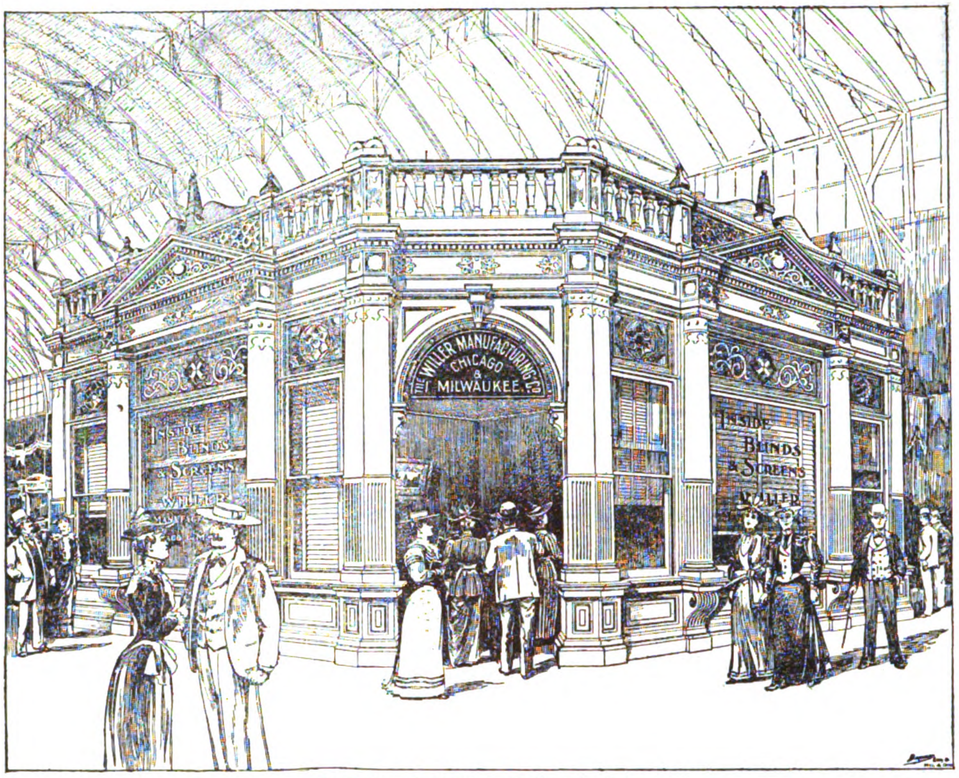
antiseptic in its nature. The quilt is much less inflammable than ordinary sheathing papers, as it contains silicon in place of their carbon.

It is guaranteed to be a warmer covering



The Willer Pavillion at the World s Fair.

than back-plaster and it is less than half as expensive as that method.

It is adapted not only to the lining of dwellings for the exclusion of heat and cold, but for use in cold-storage warehouses, ice-chests, cold-closets, or in any structure which it is desired to protect from the variations of temperature; also as a sound deadener in all kinds of buildings, its great elasticity making it admirably suited for this purpose. Samples will be furnished on application, by the manufacturer.

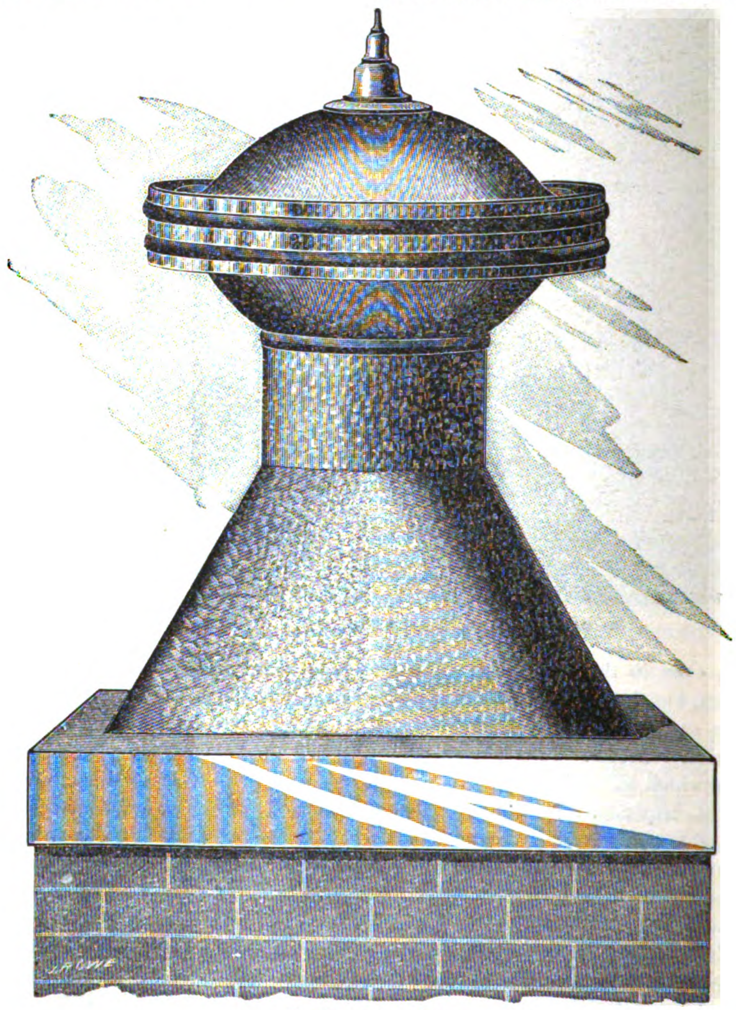
SAMUEL CABOT,
70 Kilby St., Boston, Mass.

THE WILLER MANUFACTURING COMPANY'S EXHIBIT AT THE WORLD'S FAIR.

We present herewith an illustration of an exhibit at the World's Fair by the Willer Manufacturing Company of Milwaukee, Wis. and Chicago, Ill. This company is thoroughly well known all over the country as the manufacturers and producers of the Willer sliding-blind, the first sliding-blind put on the market possessing any real merit and meeting the demands of a discriminating public. Since then a number of other manufacturers have brought out sliding-blinds and copied the principal meritorious features of the Willer blind and printed publications and illustrations of the company to an extent bordering on and in some cases actually constituting depredation and piracy and claiming to produce blinds equal and superior to any other: none of these, however, have reached the high standard for quality and merit attained by this company.

The sliding-blind is the principal specialty produced by this company and it is brought out by them in a variety of grades, finishes, etc., to suit the tastes and requirements of the wealthy and extravagant as well as the financially less fortunate or more economical builders of houses.

Besides the sliding-blind, the company has for years produced the old standard folding-blind and a special folding-blind of their own, as well as custom-made screen-doors, sliding and stationary screens for all classes of buildings. They have lately also added a Venetian-blind department to their business and are producing the blind in a variety of styles: the English Venetian-blind as well as a new sliding Venetian-blind, which latter blind is not drawn up by cords but operates the same as a sliding-blind, being balanced by springs or weights or by both and remaining in any desired position in the window.



The Globe Ventilator.

All of the company's various products are shown in a well designed pavilion, located on the gallery in the north end of the Manufactures and Liberal Arts Building, which every body, especially the architects, builders and contractors of the country, who may visit the World's Fair are cordially invited to examine.

The company's factory and home office is in Milwaukee, Wis. and their branch office at Chicago is Room 25, Adams Express Building, 183 and 185 Dearborn St.

WILLER MFG. CO.,
Milwaukee, Wis.

THE GLOBE VENTILATOR.

The Globe Ventilator is coming into more general and constant use as the years go by. The merit of this ventilator is becoming more and more recognized and it is being rewarded with a larger and more extended patronage than ever before.

The manufacturers of the Globe profiting by the experiences of others, have produced a ventilator which answers all purposes required for purifying the air of the factory or the auditorum and renders both the home and the school healthful and comfortable.

Many of the largest manufacturing concerns have adopted this system of ventilation for their plants with great satisfaction to themselves, as all odors, gases, steam and excessive heat are exhausted from the work-rooms, thus enabling the toilers to render better and more efficient as well as more profitable service.

Unquestionably the subject of ventilation is receiving more careful and serious attention than ever before. It is coming to be regarded as a necessity by the owners of all buildings designed for the use of human beings or for animals as well. One of the things that the proprietor of an opera-house, who relies upon the patronage of the public for his revenue, cannot afford to economize on is ventilation, when such economy means inferiority. For the people who patronize our theatres are not attracted by the beauty and large cost of their internal decorations — but go where they can see a good performance amid comfortable surroundings.

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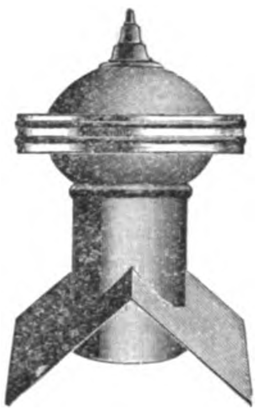

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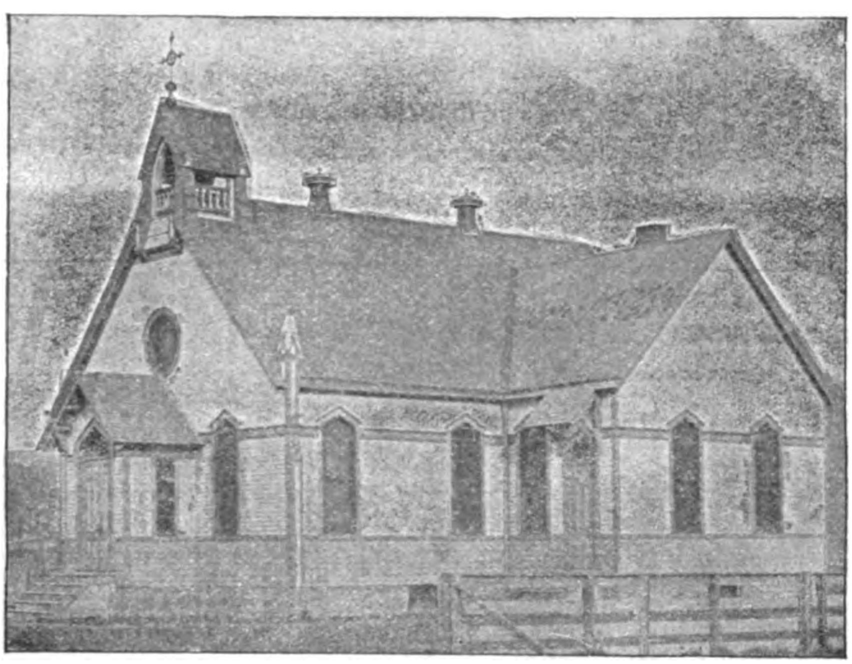

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The American Architect and Building News

ADVERTISERS' TRADE SUPPLEMENT.

No. 137. SATURDAY, NOVEMBER 4, 1893 Volume XLII. No. 932.

IRON AND BRASS WORK.

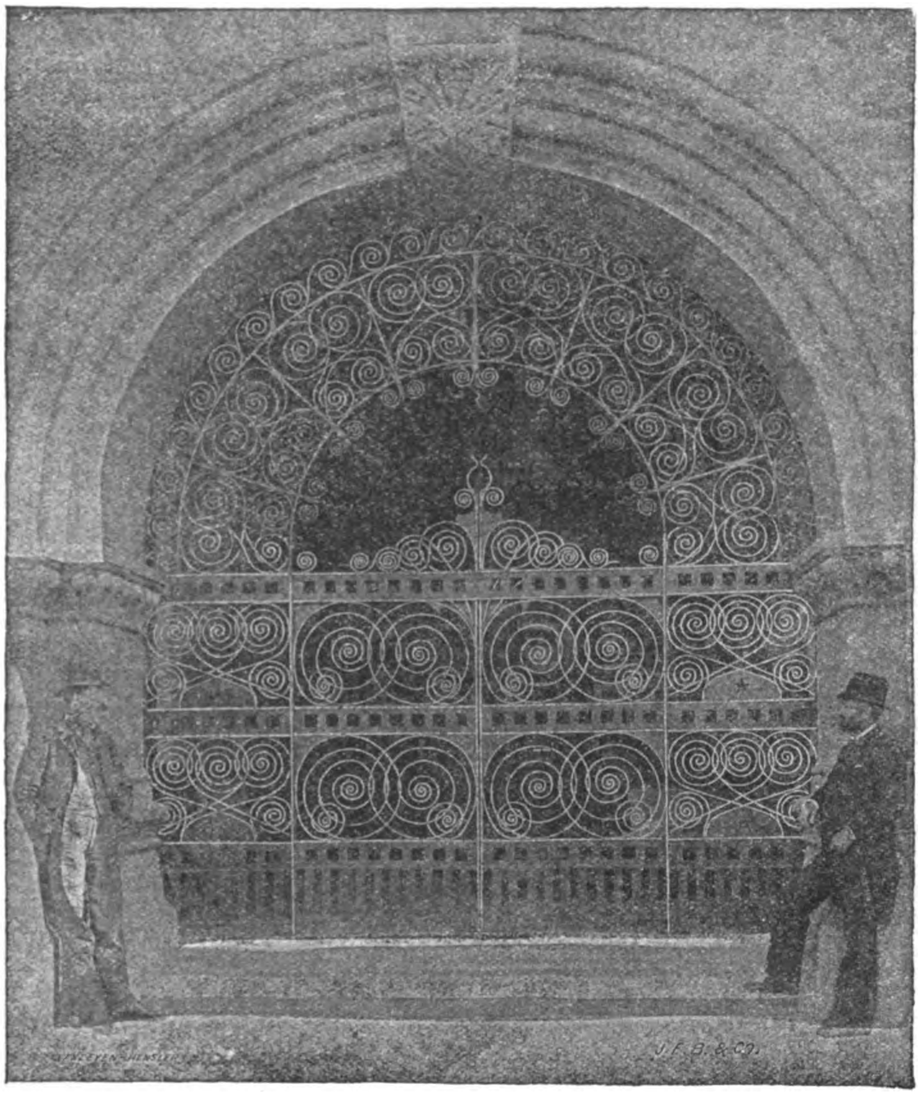
The firm of J. E. Bolles & Co., Detroit, Mich., have recently produced some fine work, a few engravings of which we illustrate in this issue. The popularity of ornamental iron and brass work is increasing daily. Parties interested will do well to correspond with the above firm who make an unlimited variety of designs in this line, also elevator inclosures, metal cars, stair-work, etc.

They state that they have recently furnished the iron stair and grill work for the United States Post-Office Building at Bay City, Mich., the iron stair-work, grills, elevator inclosure and metal cars for two elevators in the new Bearinger Block, Saginaw, E. S., W. T. Cooper, architect; the metal car, inclosure and grill-work for new *Post* Building, Washington, D. C.

Metal car for elevator in De Gives Grand Opera House, Atlanta, Ga., and metal inclosure for the Fenner Office-building, New Orleans, and Chamber of Commerce Building, Tacoma, besides many other contracts from various portions of the country.

Prospects for future business however are not as encouraging as they were one month ago.

J. E. BOLLES & CO.,
DETROIT, MICH.



Design for Entrance Gates to Mr. Wallace Hendrick's Office-Building, Fort Worth, Texas. J. E. Bolles & Co., Manufs. Messer, Sanguinet & Messer, Architects.

A WARNING TO THE PUBLIC.

We are the sole licensees to manufacture and sell metallic screens and guides under patent No. 329,893, granted to Jonathan C. Ela and Edgar W. Ela, November 10, 1885.

We also own patent No. 319,168, granted to James Washington Bachus, June 2, 1885, except States of Iowa, Illinois, Missouri and Kansas.

The metal screen and guide sold by us is manufactured under the above patents, and all persons are cautioned against infringing upon any of said patents, either by manufacturing, selling or using, as we shall claim the protection afforded by our patents, and shall prosecute for damages in the United States Courts the manufacturer, seller or user for any infringement, wherever found.

Our screens are marked, "Patented Nov. 10, 1885," and the guides, "Patented June 2 and Nov. 10, 1885."

THE METALLIC WINDOW SCREEN MFG. CO.,
Successors to F. O. Snow & Co.
465 Washington Street, Boston, Mass.

A DECISION THAT IS APPROVED BY EVERY ONE.

The Bridgeport Wood Finishing Co., Granville M. Breinig, Gen. Agt. & Supt., New Milford, Conn.; 206 E. Lake St., Chicago and 240 Pearl St., New York, has been awarded a medal and four diplomas on their Wheeler Patent Wood-filler and Breinig's Lithogen Silicate Paint.

The Connecticut Building at the World's Fair was painted entirely on the outside with Breinig's Lithogen Silicate Paint, and is acknowledged the best painted building on the grounds.

The interior woodwork of the West Virginia and Missouri State Buildings was inside entirely filled with Wheeler's Patent Wood-filler as were other fine displays of interior woodwork, and all this is in pleasing contrast as against the many fine displays of hard woods finished, and on which the varnish has shrunk and pitted. Wherever at the Fair you saw a finely finished piece of woodwork which had stood the test of climate and time, you will find that the Wheeler filler was at the bottom of it, from an exhibitor's stand to a palace car.

The woods in the Forestry Department which attracted so much attention were also filled with Wheeler's Patent Wood-filler.

THE BRIDGEPORT WOOD FINISHING CO.,
NEW MILFORD, CONN.

THE COMMERCIAL TRAVELLER A GOOD SAMARITAN.

On the occasion of a railroad disaster, a salesman of the Joseph Dixon Crucible Co., of Jersey City, N. J., was a passenger on the train. His presence of mind saved from more than slight injury a well-known clergyman. Subsequently the reverend doctor wrote the company complimenting the salesman, and

expressed himself as follows regarding the travelling fraternity:

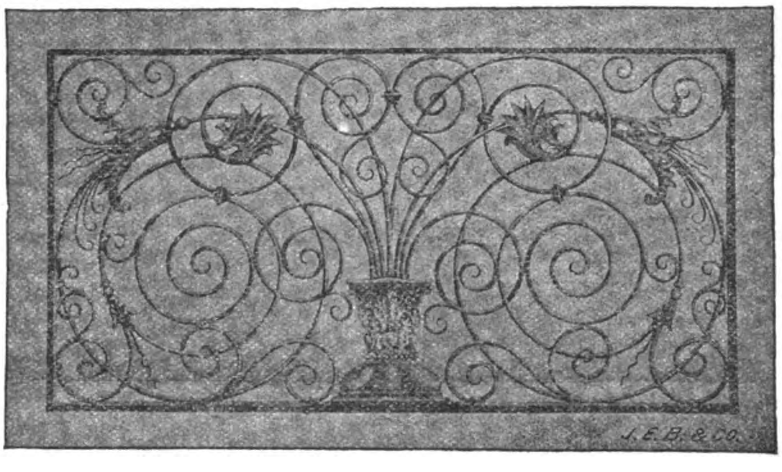
" . . . Years ago, in a lecture, I remarked that the good Samaritan was a commercial tourist (drummer). If a man ever wakes up about midnight with the bottom side of his coach in the direction of the stars, he will think that I am right. The drummer of Samaria had the best of oil and wine. The drummer of Jersey City had the best of pencils and the kindest of hearts. The iron horse will dash and the electric light will soon flash through the land where Christ and his apostles once held sweet converse in regard to who was really our neighbor. Methinks I hear the conductor at Jerusalem say, 'All aboard for Jericho. Passengers for Moab take seats in the front car.' The train may be wrecked. If so, I venture to say that the ubiquitous drummer will be the first and the last to administer to the wounded and the dying, while the fat priest and bloated Levite will either be asleep in the Pullman, waiting for the black porter to call them up, or whining about the loss of a silk umbrella or gilt-edged prayer-book. The Jersey City drummer will never be known on earth as extensively as the Samaritan, but I am certain that his name will stand as high and his reward be as great in that land where all men will be rewarded according to the deeds of mercy which they perform in this. I know that many of the commercial agents have some habits in error. Yet I want it distinctly understood that the sexton of the church where I am pastor must always invite the commercial traveller to a front seat."

JOS. DIXON CRUCIBLE CO.,
JERSEY CITY, N. J.

NOTES.

The Wickes Refrigerator Company are building in the private residence of Mr. Chas. H. Strong, Erie, Pa., what is undoubtedly one of the largest and handsomest refrigerating-plants, in private residences, in the world, contract price being $3,000. The rooms are to be floored with encaustic tile and the walls and ceiling lined with pure white-glazed Minton tiles. The shelves are to be of polished plate-glass and the brackets, cleats, grill-work, wine-locker and trim throughout will be brass, heavily nickel-plated. The outside of the room is to be finished in quartered oak. As shown, four rooms are to be supplied. One for fruits and vegetables, one for milk and butter, one for fresh meat and one for smoked meat. The tanks will be built according to the well-known Wickes refrigerating-system, and will be exactly similar, but on a larger scale than those recently built in the houses of Mrs. Geo. H. Morgan, Wm. K. Vanderbilt, H. O. Havemeyer, Anson Phelps Stokes, Chas. Van Brunt, etc.

WICKES REFRIGERATOR CO.,
NEW YORK.



Design for Brass Grill used in Residence, Dayton, Ohio. J. E. Bolles & Co., Manufacturers. Peters & Burns, Architects.

WORLD'S FAIR AWARDS.

I. P. Frink has been notified that he has been awarded a prize by the World's Columbian Exposition for the superiority of his reflectors.

Judges appointed by the officials at the World's Fair at Chicago have made awards to the Joseph Dixon Crucible Co., Jersey City, N. J., for superior products in graphite, lead-pencils, plumbago, crucibles, black-lead stoppers and nozzles, dippers, bowls, foundry-facings and lubricating graphite.

These awards are a very proper recognition of the qualities of these goods, as the Dixon Company is known throughout the world as the pioneer in the graphite industry and its goods are always considered as the standard. The United States Government in its bids for supplies says, "Dixon's, or equal."

JOSEPH DIXON CRUCIBLE CO.,
JERSEY CITY, N. J.


Design for Balcony Railing. J. E. Bolles & Co., Manufacturers.

BUILDING INTELLIGENCE.

Reported for the American Architect & Building News.

ALTERATIONS.

Brooklyn, N. Y. — *Garden St., Nos.* 56-58, five-st'y brick ale brewery, felt and gravel roof; internal

(Alterations Continued.)

alterations; cost, $4,000; owners, Claus Lipsius Brewing Co., Bushwick Ave. and Forrest St.; architect, Th. Engelhardt, 905 Broadway.

Kent Ave., s e cor. South Third St., five-st'y brick storage warehouse, gravel roof; extension to be raised two stories, two-st'y brick extension, gravel roof, to be added, and other alterations made; cost, $3,000; owner, Otto Huber, Meserole St. and Bushwick Ave.; architects, D. Acker & Son, 752 Broadway.

Philadelphia, Pa. — Alterations and additions will be made to the iron and brick warehouse of the Philadelphia Milling Co., 945 North Ninth St.

Haverford Ave., No. 3826, one-st'y brick addition to dry-house; contractors, King & Lambert, 3714 Front Ave.

Spring Garden St., No. 2129, two st'y addition, also interior and exterior alterations to building; contractor, Porter Thompson, 2037 Filbert St.

Spring Lake, N. J. — One-st'y addition and alterations to be made to the summer-house of District-attorney Geo. S. Graham.

St. Louis, Mo. — Repair brick store and building, Walnut St., bet. Sixth and Seventh Sts.: cost, $5,200; owner, E. H. Gregory; contractors, R. W. Morrison & Co.

Wilmington, Del. — Several alterations will be made to the Wilmington Institute Building.

APARTMENT-HOUSES.

Chicago, Ill. — T. B. Barry, two-st'y flats, 326 East Twenty-fourth St.; cost, $4,000.

C. McLaughlin, three-st'y flats, 158 Johnson St.; cost, $3,500.

E. Stahl, three-st'y flats, 1158 Lawndale Ave.; cost, $5,000.

C. Buckingham, 7 three-st'y flats, 171-173 West Harrison St.; cost, $19,000.

Merchant & Wheeler, 3 three-st'y flats, 219-221 Forty-sixth St.; cost, $18,000.

L. P. Mick, three-st'y flats, 6524 Wright St.; cost, $10,000.

R. R. Farson, 2 two-st'y flats, 849-851 Edgewater St.; cost, $3,000.

E. Callaghan, two-st'y flats, 255 Hinman St.; cost, $3,000.

C. Bieber, two-st'y flats, 780 Augusta St.; cost, $3,000.

John Cox, three-st'y flats, 588 Sawyer Ave.; cost, $4,600.

J. Walters, two-st'y flats, 1377 West Polk St.; cost, $3,000.

J. J. Collins, two-st'y flats, 643 Turner Ave.; cost, $3,000.

Frank Hein, two-st'y flats, 77 Werder St.; cost, $3,000.

Julius Leitzen, three-st'y flats, 171 Potomac St.; cost, $4,200.

Harry Platt, two-st'y flats, 434 Troy St.; cost, $4,200.

New York, N. Y. — *Amsterdam Ave.*, s w cor. Eighty-ninth St., 4 five-st'y brick flats, tin roofs; cost, $100,000; owner, Thomas J. McGuire, 321 West One Hundred and Eighteenth St.; architect, James W. Cole, 403 West Fifty-first St.

Eighty-second St., s s 300′ e Amsterdam Ave., five-st'y brick flats, tin roofs; cost, $22,000; owner, David Richey, 11 West Eighty-fourth St.; architect, G. A. Schellinger, 128 Broadway.

Perry St., s w cor. Fourth St, 2 five-st'y brick flats, tin roofs; cost, $41,000, owner, William Rankin, One Hundred and Sixty-second St. and North River; architect, James W. Cole, 403 West Fifty-first St.

Ninety-seventh St., n s 100′ w Second Ave., 4 five st'y brick flats, tin roofs; cost, $15,000; owner, Fritz Kuhlmann, 111 Broadway; architect, Lloyd J. Phyfe, 163 West Ninety-eighth St.

Twenty-sixth St. and Seventh Ave., six-st'y brick apartment-house; cost, $80,000; owner, Albert Rellerhouse; architect, T. S. Godwin.

Westchester Ave., cor. Eagle Ave., 2 four-st'y flats; cost, $30,000; owner, Edward D. Bertino, 670 East One Hundred and Thirty-sixth St.

CHURCHES.

Cramer Hill, Pa. — The Bethany congregation will build a new church; contractor, Mr. Hooser, Philadelphia, Pa.

Philadelphia, Pa. — *Fifty-third St.*, n Wallace St. one-st'y frame chapel; contractor, Joseph Foulk, Hamilton and Lancaster Aves.

Washington, D. C. — *Eighteenth and Madison Sts.*, stone church; cost, $80,000; owners, Calvary congregation; architect, Theophilus P. Chandler, Jr., 328 Chestnut St., Philadelphia.

West Chester, Pa. — *Barnard and Church Sts.*, Sunday-school Building; cost, $5,640; owners, Westminster Presbyterian Church; contractors, Plumer E. Jefferies.

FACTORIES.

Baltimore, Md. — *West Baltimore St., No.* 1505, two-st'y brick factory; contractor, F. E. Foss.

Brooklyn, N. Y. — *Flushing Ave.*, n s, 489′ 8″ w Marcy Ave., one-st'y brick factory, galvanized-iron roof; cost, $6,000; owners, Meurer Bros. Co., on premises; architect, Th. Engelhardt, 905 Broadway.

McKibbin St., n s, 150′ w Lorimer St., four-st'y brick factory, tin roof; cost, $9,000; owner, Joseph Wichert, Bedford Ave. and Clymer St.; architect, H. Vollweiler, 483 Hart St.

HOUSES.

Baltimore, Md. — *Holbrook St.*, near Lanvale St., 4 two-st'y brick dwells.; contractors, H. E. Cook & Bro.

Fairmount Ave., near Burk St., 6 two-st'y brick dwells.; contractor, John Kram.

Two-st'y brick dwell.; contractor, C. M. Wartman.

Oliver St., near Anne St., 16 two-st'y brick dwells.; contractor, W. J. Clendenin.

Walbrook Ave., near Payson St., 20 two st'y brick dwells.; contractor, B. Fear.

Lexington and Front Sts., three-st'y brick dwell.; contractor, C. H. Grieb.

Brooklyn, N. Y. — *Fifty eighth St.*, s s, 80′ w Second Ave., and *Fifty-ninth St.*, 80′ w Second Ave., 2 three-st'y frame dwells., gravel roofs; cost, $2,000 each; owner, Chas. Hart, Fourth Ave. and Degraw St.; architect, J. H. Pigot, 189 Montague St.

Bushwick Ave., e s, 75′ s Grove St., three-st'y frame dwell., tin and slate roof; cost, $6,000; owner, H. F. Gundrum, 70 Linden St.; architect, Th. Engelhardt, 905 Broadway.

Degraw St., n s, 87′ 7″ e Court St., four-st'y brick dwell., tin roof; cost, $6,000; owner, Philip Casey,

(Houses Continued.)

on premises; architect, J. H. Pigot, 189 Montague St.

Starr St., s s, 250′ w Knickerbocker Ave., 2 three-st'y frame dwells., tin roofs; owners and builders, J. & M. Deinhardt, 94 Starr St.; architect, G. Hellenbrand, 218 Bleecker St.

Chauncey St., n s, 220′ e Bushwick Ave., 6 two-st'y frame dwells., tin roofs; cost, $3,500 each; owner, Jas. Graham, 716 Chauncey St.

Cornelia St., n s, 300′ e Bushwick Ave., 4 three-st'y frame dwells., tin roofs; total cost, $14,000; owner and builder, John Menhare, 25 Bleecker St.; architect, H. W. Billard, Jefferson Building.

Baltic St., s s, 76′ 10″ w Fourth Ave., four-st'y brick dwell., tin roof; cost, $3,000; owner, E. A. Walley, Seventh Ave., near Carroll St.; architect, R. Dixon, 219 Montague St.

Fifty-fourth St., n s, 120′ w Fifth Ave., 4 two-st'y brick dwells., tin roofs; cost, $3,500 each; owners, C. & A. Hamilton, Fifty-second St. and Fourth Ave.; architect, Thos. Bennett, 181 Fifty-seventh St.

Cheltenham, Pa.—Dwell.; owner, Mrs. John O. Keim; architect, Minerva Parker Nichols, 1616 Mt. Vernon St.

Germantown, Pa.—*Wayne Ave.*, s School Lane, 3 two-st'y stone dwells.; contractors, Thomas W. Wright & Son, 7 Harvey St.

Makin St., No. 56, two-st'y dwell.; owner, James Hillyer.

Media, Pa.—*Vernon and Washington Sts.*, three-st'y brick dwell.; owner, Benjamin Brodbelt.

Philadelphia, Pa.—*Waterloo St., No.* 1719, three-st'y brick dwell.; owner, Eugene Schmidt, Jr., 1719 Mascher St.

Amber and Monmouth Sts., several dwells.; owner, C. C. Moore.

G St., s Allegheny Ave., 10 two-st'y brick dwells.; contractors, Quigg & McLinden, 303 East Indiana Ave.

Springer St., w Cresson St., 4 two-st'y dwells.; contractor, Martin Hilgel, 45 Church St.

Broad St., n Thompson St., four-st'y dwell.; contractors, J. E. & A. L. Pennock, 305 Walnut St.

Harold St., e Twenty-sixth St., 2 two-st'y dwells.; contractor, E. L. Savidge, 2500 North Twenty-seventh St.

Horter St., 4 two-st'y dwells., owner, Wm. G. Griffith, Sharpnack and Chew Sts.

Sixth St., n Indiana Ave., 2 two-st'y dwells.; owner, Jacob Marsch, Rising Sun Lane and Fifth St.

Duncan St., s Stiles St., 3 two-st'y brick and frame dwells.; owners, Smedley & Bro.

(Houses Continued.)

Fifteenth St., n Susquehanna Ave., three-st'y brick dwell.; contractor, J. W. Kline, 2252 Willington St.

Cayuga St., w Carlisle St., 2 two-st'y dwells.; owner, G. F. Gray, 1946 Wayne Terrace.

Comley St., s Jackson St., two-st'y frame dwell.; contractor, E. T. Bender, 5903 Tulip St.

Thompson St., w Norris St., three-st'y brick dwell.; contractor, Edward Engle, 1243 East Susquehanna Ave.

North Ninth St., No. 254, four-st'y brick dwell. and store; owner, Dr. J. H. W. Chestnut, 1757 Frankford Ave.

Chelten Ave., n Norris St., 2 two-st'y brick dwells. and stores, also two-st'y brick stable; contractor, Ashton S. Tourison, 5511 Germantown Ave.

Germantown Ave., n Church St., three-st'y brick dwell. and hotel; contractor, Ashton S. Tourison, 5511 Germantown Ave.

Reading, Pa.—*Pear St.*, bet. Washington and Walnut Sts., 6 two-st'y brick dwells.; owner, Catharine Blatt.

St. Louis, Mo.—Two-st'y dwell., Sixth St., bet. Haven and Loughborough Sts.; cost, $3,500; owner, J. H. Dates; contractor, Chas. Hall.

One-and-one-half-st'y dwell., Virginia and Merimac Sts.; cost, $4,000; owner, Hy. Oldeg; contractors, Kopp & Hardbeck.

Swathmore, Pa.—On the De Aimond tract, 3 dwells. will be built.

OFFICE-BUILDINGS.

Newark, N. J.—*Bank St.*, fourteen-st'y office-building; owners, Prudential Industrial Insurance Co.; architect, George B. Post, New York.

STABLES.

Manayunk, Pa.—*Main St. and Green Lane*, two-st'y stone and brick stable; owners, Glen Willow Ice Manufacturing Co., 4451 Main St.

Philadelphia, Pa.—*Juniper St.*, n Snyder Ave., two-st'y brick stable; contractor, Jos. E. Clark, 2006 South Thirteenth St.

Warnock St., s w cor. Cambria St., two-st'y brick stable; contractor, Henry Sills, 2802 Filmore St.

Butler St., w Sixteenth St., two-st'y stable; owner, D. C. Murtha, Sixteenth and Butler Sts.

North Twenty-eighth St., No. 1223, *rear*, three-st'y brick stable; contractor, Chas. D. Hill, 1511 North Twenty-seventh St.

Ruth St., n Cambria St., two-st'y brick stable; owner, Cornelius Riely, 1809 East Cambria St.

Parks St., one-st'y brick stable; contractor, Wm. J. Johnson, 2740 Federal St.

STORES.

Brooklyn, N. Y.—*Second St.*, w s, 19′ 2″ s Fifty-eighth St., 6 three-st'y frame stores and dwells., gravel roofs; cost, $2,000 each; owner and builder, Chas. Hart, Fourth Ave. and Degraw St.; architect, J. H. Pigot, 189 Montague St.

Second Ave., n w cor. Fifty-ninth St., and *Second Ave.*, s w cor. Fifty-eighth St., 2 three-st'y frame stores and dwells., gravel roofs; cost, $2,000 each; owner and builder, Chas. Hart, Fourth Ave. and Degraw St.; architect, J. H. Pigot, 189 Montague St.

Court St., No. 84, five-st'y brick store and dwell., tin roof; cost, $12,000, owner, Mark Rosenthal, 104 Court St.; architect, Michael Bernstein, 241 East Broadway, New York City.

Withers St., n s, 150′ e Ewen St., four-st'y frame store and dwell., tin roof; cost, $5,500; owner, Estate of Peter Kelaher, 254 South First St.; architect, Th. Engelhardt, 905 Broadway.

Hull St., n s, 90′ e Stone Ave., 3 three-st'y frame stores and dwells., tin roofs; cost, $4,500 each; owner and builder, Jos. Eirrich, 90 Hamburgh Ave.

Watkins St., e s, 100′ s Eastern Parkway, 4 four-st'y brick stores and dwells., tin roofs; cost, $8,500; owner, Abraham Simons.

Philadelphia, Pa.—*Orthodox St.*, w Tremont Ave., two-st'y brick store and dwell.; contractor, Andrew Anderson, 3471 Weikel St.

Poplar St., No. 1009, store; owner, Wm. Aab, 233 Fairmount Ave.

Taney and Clearfield Sts., one-st'y brick store; owner, Alphonse Runtz Co., 3081 Taney St.

Girard Ave., e Thirty-eighth St., 3 one-st'y brick store and storage cellars; contractor, Chas. Auchter, 1523 North Twenty-seventh St.

Richmond St., three-st'y store with back buildings; contractor, W. J. Welsh, 3193 Clifton St.

St. Louis, Mo.—Two-st'y store and flats, Taylor Ave. and Market St.; cost, $5,000; owner, C. Y. Simon; contractor, F. Wende.

Two-st'y store building, w s Seventh St., bet. Olive and Locust Sts.; cost, $12,000; owner, Chas. Fider; contractor, S. H. Hoffmann.

MISCELLANEOUS.

Philadelphia, Pa.—*Levering St., No.* 112, two-st'y brick laundry; contractor, John Stimmler, 4118 Manayunk Ave.

Barclay St., No. 705, one-st'y brick laundry; contractor, Thomas Eccles, 206 Gaskill St.

Diamond St., No. 2846, 2 brick buildings; owner, Dr. L. R. Slifer.

Third St., n e cor. Jarvis St., three-st'y brick building; contractor, Edward Malloy, 2855 Kensington Ave.

[*See Alphabetical Index on page XVIII for Pagination.*]

Classified Advertisements.

[Advertisers can be indexed only under a single head free of charge].

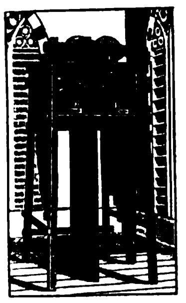
ALSEN'S PORTLAND CEMENT

is the strongest and most serviceable Cement made, and will permit the admixture of a larger amount of sand or gravel with less loss of strength than any other brand; it is therefore the most economical. It is the finest ground cement made, and has the largest bulk to the barrel.

The following test, made in actual work, by Col. D. C. Houston, Corps of Engineers, U. S. A., at the sea wall around Governor's Island, New York Harbor, has never been equalled by any other cement. It is as follows: Tensile strength per square inch, one day, 384 pounds; seven days, 600 pounds; thirty days, 818 pounds.

For Sidewalks it gives the best color, and the most endurable wearing surface. Most of the prominent Railroad Bridges and the large Office Buildings of the country stand upon a foundation of concrete made of ALSEN'S CEMENT.

Alsen's Portland Cement Works, New York Office, 143 Liberty Street.



TUBULAR

CHIME BELLS

Harrington Patents.

Established in England. Introduced here.

Lighter in Weight
Sweeter in Tone
Cheaper in Price
Than the ordinary bell

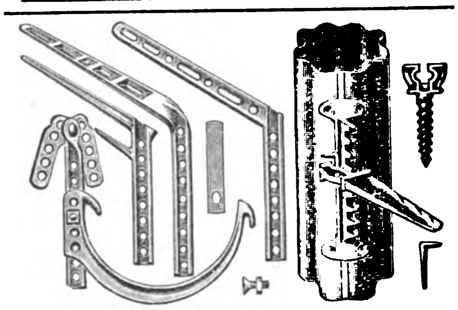
Catalogue with full description.

U. S. Tubular Bell Co., Methuen, Mass.

Brooks, Shoolbridge & Co.

7 Bowling Green, New York.

ENGLISH PORTLAND CEMENT.



THE BEST EAVE TROUGH HANGERS AND PIPE FASTENERS ON EARTH.

Also Berger's Long Eave Gutters, Pipe Hooks and Fasteners of every description, Ridgeing Crestings, Finials, Registers and Ventilators, and samples and catalogues free.

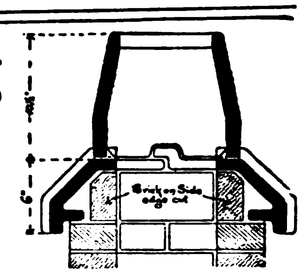
BERGER BROS.

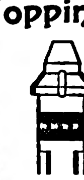
227 Arch Street, Philadelphia, Pa.

THE HANSEN PATENT **Weather-Protecting**

SALT GLAZED, **(EVER-LASTING)**

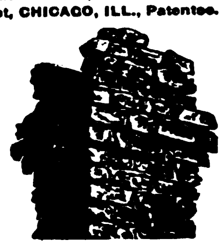
Terra Cotta Chimney Topping.





THESE Toppings, made by steam-press, VITRIFIED, SALT-GLAZED and in RICH DARK BROWN color, finish and weather-resisting quality are just like first-class Ohio sewer pipe, and cost only a trifle more than common unprotected brick toppings.

HARALD M. HANSEN, Architect,
88 La Salle Street, CHICAGO, ILL., Patentee.



ECONOMY?

ORNAMENTAL FORMS ALSO MADE. WRITE FOR PRICES, ETC.

Manufactured and for Sale, under License, by following Firms and their Agents:

Messrs. CAMP & THOMPSON, Cuyahoga Falls, Ohio.

THE STANDARD DRAIN-PIPE CO., St. Johns, P. Q., Canada.

W. S. DICKEY CLAY MANUFACTURING CO., New York Life Bldg., Kansas City, Mo.

EMPIRE FIREPROOFING CO., Main Office Cor. Wood and Fifth Ave., Pittsburgh, Pa.

Works at Empire, Ohio.

Also, Manufacturers of Wall Coping, Sewer Pipe and other Clay Products.

MONOGRAPHS

Of American Architecture, - No. 5.

TRINITY CHURCH,

BOSTON, MASS.,

GAMBRILL & RICHARDSON, Architects.

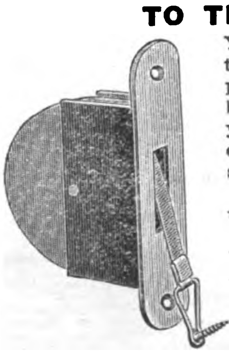
Twenty-three Plates, of which one is Heliochrome. Price, $10.00.

TICKNOR & CO., Boston, Mass.

It Don't

APPEAR JUST RIGHT

TO THINK



You would overlook the most important part of your building by neglecting to have your windows properly counterbalanced so they work free.

Have your Architect specify our

Steel Frame Sash Balance

if you want good results.

PULLMAN SASH BALANCE CO.,

ROCHESTER, N. Y.

SOMETHING NEW FOR THE STABLE!

READ'S PATENT HARNESS BRACKET.

An article long wanted but never before made. Holding the whole harness, taking no more room than the ordinary hook or peg, and can be used for both single or double harness. The harness can be placed upon or removed as easily as on the common hook, and gives the harness case a neat and finished appearance, as it carries the harness up uniformly in width with the saddle, besides keeping the bridle and breast-plate in their proper shape. They are neatly japanned, with gilt facings. *Price, $18 per dozen. Are now in use in hundreds of first-class private stables throughout the United States. The best guarantee being between two and three thousand now in use by the Harness Trade in Boston alone*, and are endorsed and approved by the following named gentlemen, all of whom have them in use: Boston: R. H. White; J. Montgomery Sears; J. T. Morse, Jr.; Thos. Motley; So. Boston: Benjamin Dean. Cambridge: F. A. Kennedy; Waldo Adams, with the Adams Express Co. Milton: Col. H. S. Russell; J. Malcolm Forbes. John Bartlett. Portsmouth, N. H.: Hon. Frank Jones. Baltimore, Md.: J. D. Mallory. Newton: J. C. Potter; C. E. Billings; Dedham: A. W. Nickerson. Readville: C. G. White. Swampscott: C. P. Curtis A. R. Mitchell. Waltham: James H. Ellison. Philadelphia, Pa.: Edward N. Williams, of the Baldwin Locomotive Works.

Each Brackett lettered "J. J. READ, BOSTON, MASS." For sale by dealers everywhere.

Read's Patent Combination Whip Rack for both English, Coach and Straight Whips. *Price*, 50c. *each.*

Riding-Saddle Brackett has polished cherry wood tops. *Price*, $3.00 *each.*

The public is cautioned against all similar brackets not marked with my stamp, as such brackets are infringements of patents held by me. *JAMES J. READ, 13 Tremont Row* (Room 10), *Boston.*

THE AMERICAN ARCHITECT AND BUILDING NEWS

ADVERTISERS' TRADE SUPPLEMENT.

No. 138. SATURDAY, DECEMBER 2, 1893. VOLUME XLII. No. 936.

NEW YORK MASTIC WORKS.

THE Compagnie Générale des Asphaltes de France is the *originator* of the compressed asphalte industry for roadways, as well as of the plant and tools used therein.

It is the sole proprietor of the celebrated asphalte mine of Seyssel, and of extensive asphalte mines in Ragusa, Sicily. It also holds the concession of asphalte mines at Mons (Gard) France.

Realizing the demand in the United States for asphalte work as used in Paris and other European Cities, this company has purchased freehold property (covering about thirty-three lots) at Hunter's Point on the East River in New York Harbor, and has erected steam crushing, grinding and mastic works for the purpose of manufacturing Seyssel rock asphalte powder, and mastic, to be delivered to any point in the United States or Canada.

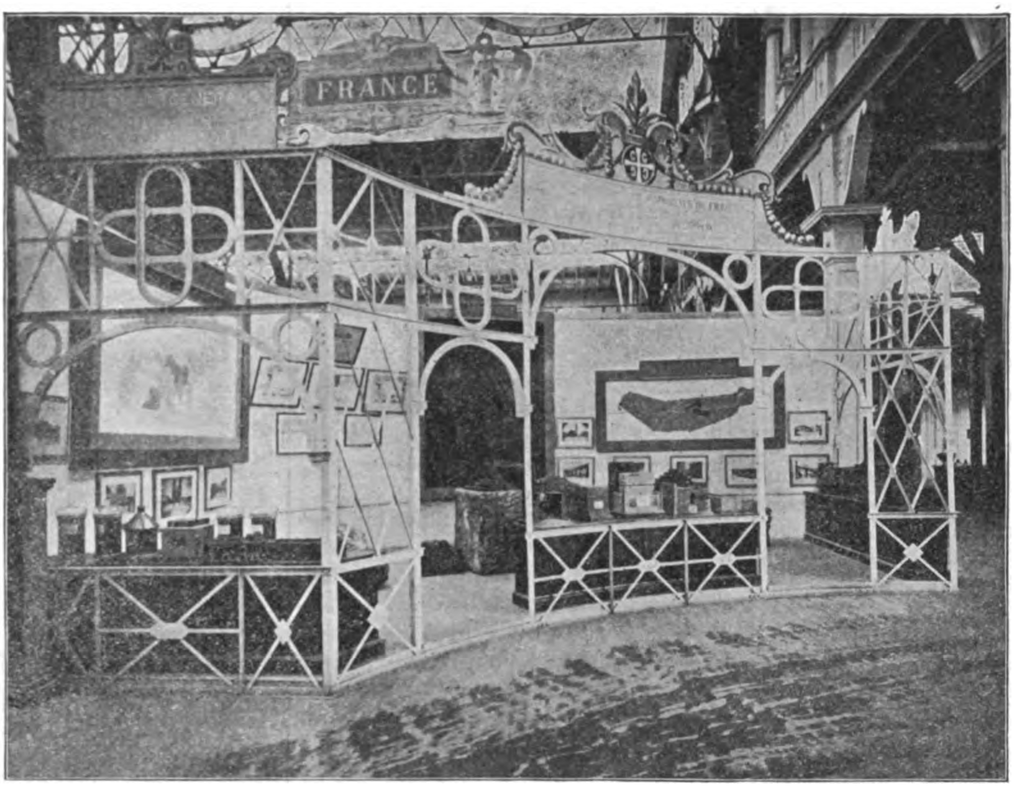


Exhibit of the New York Mastic Works at the World's Fair, Chicago.

The New York Mastic Works have for many years laid the Seyssel Rock Asphalte Mastic in the principal parks in the City of New York and have themselves, and through their agents, shown the superiority of the Seyssel asphalte for the various uses for which it has been specified in buildings and engineering constructions. They are now prepared to take contracts for roadways of compressed asphalte as laid in Paris, with the products of their own mines. They have just finished extensive work in Battery and East River Parks in New York and have the contracts for asphalte work at Museum of Natural History, House of Relief, German Hospital, U. S. Barge Office, Thomas Building, St. Mary's Hospital, 80th Street Grammar School, 46th Street Grammar School, etc. Compressed rock has been laid at Eagle Avenue and 162d Street, New York City.

NEW YORK MASTIC WORKS,
NEW YORK, N. Y.

IN MEMORIAM.

SYLVESTER PHINEAS PIERCE.

BORN September 19, 1814. Died November 5, 1893.

Our President, and the head of our house, was born in the little hamlet of Sanquoit, Town of Paris, Oneida County, New York. He was the fifth of a family of eight children of Dr. Spaulding Pierce and Abigail Bacon, a representative couple of the sturdy New England stock which settled the wilderness of Central New York, then regarded as the far west; Dr. Pierce coming from Plainfield, in the Connecticut Valley, and his wife a native of Dedham, in the old Bay State. Doctor Pierce settled in Paris, Oneida County, and was a practising physician of the old school, covering a large area of the early settlements of the time. He died when the boy Sylvester was but twelve years old. Financial reverses just previous to his death left the family in such circumstances that Sylvester soon found it necessary to make his own way in the world, and obtained employment in the village store. Afterward, for two years he was a clerk in the store of Jay Hathaway, of Rome, N. Y. Experience by day and study by night gave him a business education, and he soon gained a reputation as an expert accountant. From Rome he went to Utica, where he was employed in the dry-goods store of Theo. S. Gould, and later in the crockery establishment of Ransom Curtis. Observations made when travelling through the country in the service of this concern decided Mr. Pierce to locate in the village of Syracuse, and in 1839 he came here and opened a crockery store, removing in 1840 to the present site, where for fifty-three years Mr. Pierce has been the head of the business. From the village store grew a large importing and jobbing house, which became famous throughout the State and one of the leading establishments of our city. With the introduction of gas-lighting Mr. Pierce added chandeliers to his business, and started a small shop devoted to gas-fitting and piping. From this beginning sprang a business which rapidly developed and led to the establishment of the firm of Pierce, Butler & Pierce, and later to the incorporation of the Pierce, Butler & Pierce Manufacturing Company. Through all of these years of business life, scrupulous honesty, steadfast integrity, and a high order of business sagacity have characterized all undertakings in which he engaged. He leaves us and this life not only with the respect of all who have known him, but with the deeply-fixed love and veneration

of all those who have been connected with this gentle, kindly, true-hearted man.

Verily, our loss is great.

PIERCE, BUTLER & PIERCE MFG. CO.
S. P. PIERCE, SONS & CO.

CABOT'S SHEATHING QUILT.

THIS substance combines the most perfect non-conducting properties, both for heat and sound. It is by actual test warmer than three thicknesses of the best wool-felted paper, and will give a far warmer house than is obtained by back-plastering, — at a fraction of the expense.

For deadening purposes, its wonderful elasticity renders it much superior to anything hitherto devised. It may thus be seen that its utility is as great under the brick or between the floors of a city building as beneath the clapboards or shingles of a country house.

The ribbon-like structure of the fibre which is used in the interior gives a laminated, overlying succession of layers, similar to the feathers of a bird's body, and peculiarly fitted to keep out cold, while its antiseptic qualities and freedom from animal matter protect it from moths and other insects.

As the sea plant of which it is made contains silicon in place of carbon, the Quilt is much less inflammable than common sheathing papers. This can easily be determined by testing with a match.

The Quilt is sold in bales, each bale containing a Quilt one yard wide and fifty-six yards long, — containing over five hundred square feet (9 x 56 = 504), — which can be cut to any desired length, and easily handled and applied. It can be cut also to fit window and door spaces.

When used as a deadener between floors, the Quilt is laid on the under boarding and the upper floor is then put directly on it, without strips of any sort, in order to take advantage of its full deadening powers.

When used in partitions for deadening purposes, it can be applied to the studs.

We do not wish to lay down rules as to the use of Sheathing Quilt, as it can be applied in many different ways and used for an almost endless variety of purposes.

Among the latter are the protection of cold-storage warehouses, ice-chests, cold closets, attics and all exposed portions of houses, where, to secure an even more perfect protection, it is often advisable to apply it both under the shingles and on the studding inside.

Labor is always the most expensive item; and the fact that this material can be applied in incomparably shorter time than back-plaster is a strong point in its favor. Back-plastering costs about *two and one-fifth cents per square foot*, while our Quilt costs *less than one cent* per square foot. This of course would not be so important if the back-plastering were the better method, but we guarantee the Quilt to be a more effective protection against heat and cold than back-plaster. Once a house is finished — if it is found to be cold, the only remedy is an expensive heating-apparatus and large quantities of fuel. Quilt is the "ounce of prevention," and this costly addition the "pound of cure."

It is also much more effective, and much less expensive, than any other sound-deadening material that has any value at all.

The peculiar fitness of our Sheathing Quilt for use in houses of moderate cost will be seen at once. In such houses the construction must necessarily be less thorough than in more costly dwellings, and they offer, therefore, a less effective protection against heat and cold.

"Thin" houses, houses that "leak wind," or any sort of building of cheap construction, can be made practically weather-proof at a very slight expense with our material. For this reason it will be found a great economizer of fuel, as the heat, once created, cannot escape, and the cold will be kept out. The latter, of course, applies with equal force to heat in summer.

The cost of a sufficient amount of Quilt to thoroughly line the outside walls of a house 30 *by* 20 *feet and* 20 *feet high, and having an L* 15 *by* 10 *feet, and ten feet high, is but* $22.72; *and if you then line the roof of both house and L, the cost is but* $10 *more.*

Think of it! Completely encasing your house in this temperature-defying Quilt, and securing almost absolute immunity from the cold of winter and the heat of summer, — at an expense of $32.72; *less than one cent per square foot. It is securing home comfort for almost nothing.*

Samples will be sent on application.

SAMUEL CABOT, *Patentee and Sole Manufacturer*,
70 KILBY STREET, BOSTON, MASS.

NOTES.

30 CORTLANDT STREET, NEW YORK CITY, N. Y.,
November 3, 1893.

Gentlemen, — Below we give copy of a special notice in relation to boilers at the World's Fair, Chicago, which we placed on the front of our boilers during the last few weeks of the Fair. We would be very much obliged if you would give this notice a place in your reading columns:

SPECIAL NOTICE.

These boilers have received no Award.
Why? Read! Learn!

"We were informed that it was the purpose of the Jury to make awards on boilers based entirely on the written statements of the exhibitors of boilers, without tests or any personal knowledge in the possession of said Jury concerning the comparative construction, operation, economy, or durability of said boilers.

"We were asked to make such a statement, and were informed that all other exhibitors of boilers had been requested to make a like statement of their claims for the consideration of the Jury of Awards.

"Believing that an award, based on such insufficient knowledge on the part of said Jury, could be of no practical value, and notwithstanding the expense incurred by this Company in making an exhibit, we respectfully declined to make any such written statement for the purpose of receiving an award upon our boilers.

"While we do not in the least envy those who have, upon such knowledge by the Jury, been awarded premiums, we are equally content to stand upon the record without an award based on such a knowledge of our goods." Yours very truly,

THE BABCOCK & WILCOX CO.,
NEW YORK, N. Y.

NEW YORK, N. Y., November 10, 1893.

TO I. P. FRINK, 551 PEARL STREET: —

Dear Sir, — The two reflectors which you put in the Hope Church have now been in use six months, and we have had ample opportunity to test their value. I can truthfully say, they give unbounded satisfaction. Their handsome appearance adds much to the furnishing of the building; but their real value lies in their economy in the consumption of gas, and in the diffusion of a mellow and pleasant light throughout the entire building. I have found from a practical experience with all methods, that the lighting of a building from a central reflector is vastly superior to any other method, and I believe yours is the best reflector made. You may make any use that you choose of this testimony which is given for the benefit of those who are seeking the best results possible in the lighting of their church.

Sincerely yours, RICHARD HARTLEY,
Pastor of Hope Baptist Church.

BUILDING INTELLIGENCE.

Reported for the American Architect & Building News.

APARTMENT-HOUSES.

St. Louis, Mo. — Two-st'y flats, s s Shenandoah St., bet. Grand and Spring Aves.; cost, $7,000; owner and contractor, T. H. Busey.

CHURCHES.

Baltimore, Md. — Temple to cost $35,000 is contemplated by the congregation of Chizuk Emunah Synagogue.

Beaver Falls, Pa. — Plans are out for a new M. P. Church; cost, $15,000.

Brooklyn, N. Y. — *Steuben St.*, e s, 100′ s Myrtle Ave., two-st'y brick church, tin roof; cost, $20,000; owners, Emanuel Baptist Church, Lafayette Ave.; architect, W. B. Tubby, 81 Fulton St., New York; builders, S. W. Seaman & Son, 133 Grand Ave.

Camden, N. J. — All Saints' Episcopal Church will be built at Stanwick.

Chicago, Ill. — John Chapel, church, 1123 1129 Sawyer Ave.; cost, $5,000.

Kennett Square, Pa. — *Linden St.*, brick church will be built by the Bethel Methodist Congregation; Rev. Spriggs, pastor.

Lewickley, Pa. — The Presbyterian and Episcopal Congregations are each expecting to build new churches.

Lowell, Mass. — *Princeton St.*, church; Rev. R. A. Green, pastor.

Philadelphia, Pa. — *Cayuga St. and Germantown Ave.*, stone chapel for All Saints' Lutheran Church.

Wilkinsburg, Pa. — A new church will be built by the M. P. Church Congregation.

FACTORIES.

Brooklyn, N. Y. — *Thirty-ninth St.*, e Eleventh Ave., seven-st'y factory; cost, $30,000; owner, C. A. Jacob, 193 Van Brunt St.

Chicago, Ill. — Charles Moss, three-st'y factory, 768-770 Elk Grove Ave.; cost, $3,500.

J. Rothenberg, 4 two-st'y factories and flats, 969 West Madison St.; cost, $14,000.

HOTELS.

Carbondale, Pa. — Four-st'y brick and stone hotel; cost, $50,000; architect, L. C. Holden, Lincoln Building, New York City; contractor, Conrad Schroeder, Scranton, Pa.

Old Point Comfort, Pa. — Hotel; architects, J. Fraser & Son, 413 Walnut St., Philadelphia.

Reading, Pa. — *Eleventh and Penn Sts.*, hotel; cost, $100,000. The Penn Real Estate Co. can give information.

HOUSES.

Ambler, Pa. — Stone and shingle dwell.; owner and architect, E. C. Kent, 140 South Fourth St., Philadelphia.

Dwell.; owner, John J. Houghton; architect, E. C. Kent.

Baltimore, Md. — J. B. Ammidon, three-st'y brick building, e s Park Ave., bet. McMechen and Wilson Sts.

E. F. Ruddell, 3 two-st'y brick buildings, s s Walker St., bet. Bond and Bethel Sts.

Wm. Bosley, 2 two-st'y brick buildings, n s Fort Ave., w Richardson St.

J. H. Warthen, three-st'y brick building, Patterson Ave., bet. Carey and Stockton Sts.

Jos. H. Pentz, 13 two-st'y brick buildings, s s Harlem Ave., beg. s e cor. Payson St.

Jas. W. Amos, 7 two-st'y brick buildings, s s Lanvale St., beg. s e cor. Appleton St.

J. K. Hubbard, 7 two-st'y brick buildings, e s McCulloh St., s Whitelock St.

Bay Head, N. J. — Dwell.; owner, Dr. Charles P. Noble, Philadelphia; architect, Charles P. Baldwin, Prudential Building, Newark, N. J.

Bloomfield, N. J. — Three-st'y frame dwell.; cost, $8,500; owner, Thos. H. Decker; architect, Charles P. Baldwin, Prudential Building, Newark, N. J.

Boston, Mass. — *Anawan Ave.*, near Park St., Ward 23, 3 frame dwells., 23.9′ x 29′, 24.6′ x 33.6′, 28′ x 29′; owner, Mrs. G. L. Rogers; builder, W. S. Mitchell.

Brooklyn, N. Y. — *Pulaski St.*, n s, 445′ e Tompkins Ave., 2 two-and-one-half-st'y brick dwells., tin roofs; cost, $6,000 each; owner, T. E. Greenland, 171 Pulaski St.

South Fifth St., s s, 150′ e Hooper St., four-st'y brick dwell., tin roof; cost, $8,000; owner and builder, Hugh Fehling, 391 South Fifth St.; architect, Th. Engelhardt, 905 Broadway.

Nassau Ave., n s, 44′ e North Henry St., 3 three-st'y frame dwells., gravel roofs; cost, $2,500 each; owner and builder, Thos. Haslau, 220 Monitor St.

Milford St., w s, 110′ n Glenmore Ave., 2 two-st'y frame dwells., tin roofs; cost, $1,800 each; owner, S. W. Stoothoff, Eastern Parkway, near Montauk Ave.; architect, L. F. Schillinger, 581 Liberty Pl.

De Kalb Ave., s s, 250′ e Irving Ave., two-st'y frame dwell., tin roof; cost, $3,800; owner, Conrad Reuter, 1459 De Kalb Ave.; architect, H. E. Fink, 200 Knickerbocker Ave.

Park Pl., s s, 137′ 2″ w Attica Ave., 2 two-st'y frame dwells., tin roofs; cost, $1,800 each.; owner, T. A. Ufson, 489 Hooper St.; architect, Chas. Infanger, Van Siclen and Atlantic Aves.

Fifty-third St., s s, 240′ e Second Ave., 2 two-st'y frame dwells., tin roofs; cost, $1,800 each; owner, W. C. Van Duzer, 199 Fifty-seventh St.

(*Houses Continued.*)

Stockholm St., s s, 150' w Central Ave., 2 three-st'y frame dwells., tin roofs; cost, $6 500 each; owner, S. Jacoby, 16 Beaver St.; architect, Frank Holmberg, 1169 Broadway.

Montauk Ave., w s, 95' n Eastern Parkway, 5 two-st'y frame dwells., tin roofs; cost, $10,000; owners, E. Sutterlein and L. Feldmann; architect, Chas. Infanger, Van Siclen and Atlantic Aves.

Monitor St., w s, 123' n Van Pelt Ave., 2 two-st'y frame dwells., felt and tar roofs; cost, $1,600 each; owner, Martin Rourke, 85 Monitor St.

Garfield Pl., n s, 175' 9" w Fifth Ave., 2 three-st'y brick dwells., tin roofs; cost, $4,000 each; owner and builder, A. G. Calder, Jr., 420 Eighth St.; architect, W. H. Calder, 371 Sixth Ave.

Schaffer St., n s, 100' e Evergreen Ave., 4 two-st'y frame dwells., tin roofs; cost, $3,000 each; owner, Chas. F. Gastmyer, 1172 Jefferson Ave.

Camden, N. J.—*Seventh St.*, bet. Elm and Birch Sts., 12 dwells.; contractors, D. Lennon Moore & Co.

Chicago, Ill.—E. E. Kilmar, two-st'y dwell., 5735 Indiana Ave.; cost, $12,000.

P. J. McDonough, two-st'y dwell., 7460 Bond Ave.; cost, $5,000.

S. M. Moore, three-st'y dwell., 5530-5532 Madison Ave.; cost, $7,000.

B. B. Cumming, two-st'y dwell., 5737-5739 Lexington Ave.; cost, $8,000.

Dr. Colby, two-st'y dwell., 550 Jackson Boulevard; cost, $7,000.

Garner Bros, 2 two-st'y dwells., 1040-1042 Fifty-fourth Ct.; cost, $7,000.

F. C. Heath, 3 two-st'y dwells., 2816 Indiana Ave.; cost, $8,000.

Cincinnati, Ohio.—Brick and stone dwell., slate roof; cost, $10,000; owner, P. C. Butler; architect, W. W. Franklin, Fifth and Race Sts.

Clarksboro, N. J.—A new parsonage will be built.

Cramer Hill, N. J.—*Church St.*, 2 dwells.; contractor, W. I. May.

Detroit, Mich.—W. C. Claxton, two-st'y brick double dwells., 647-49 Fourth Ave.; cost, $5,600.

J. H. McMicael, 2 frame dwells., 1361-1369 Eighteenth St.; cost, $7,000.

A. C. Varney & Co., two-st'y brick dwell., 116 Watson St.; cost, $7,000; also two-st'y double brick dwell., 118-20 Watson St.; cost, $13,000; also two-st'y double brick dwell., 549 57 Brush St.; cost, $8,000; also frame dwell., 423 Trumbull Ave.; cost, $3,000.

Herman Turski, two-st'y brick dwell., 67 Frederick St; cost, $9,000.

Nicholson & Boden, two-st'y brick dwell., 549 Trumbull Ave.; cost, $5,000.

(*Houses Continued.*)

Parsons & Co., 5 two-st'y frame dwells., 64, 70, 76, 82, 100 Gulllos St.; cost, $6,000.

Geo. Everson, two-st'y brick dwell.; 129 Ferry Ave.; cost, $9,000.

A. C. Varney & Co., three-st'y brick double dwell., 60-62 West Elizabeth St.; cost, $12,000.

Vinton & Co., three-st'y brick dwell., 107 Charlotte Ave.; cost, $6,000.

J. T. Currl, two-st'y frame dwell., 42 Boulevard; cost, $4,000.

A. L. Lewis, frame dwell., 387 Cadillac Ave.; cost, $3,200.

Several brick and stone dwells., slate roofs; cost, $20,000; owner, Henry W. Holcomb, 277 Merrick Ave.; architect, Peter E. Redmond, 43 Reed Pl.

Germantown, Pa.—*Phlena St.*, n w cor. Pelham Road, 2 two-and-one-half-st'y brick dwells.; contractors, Wendell & Smith.

Haddonfield, N. J.—On the West Haddonfield Tract, J. Roden will build a house.

Westmont and Redmon Aves., dwell.; cost, $7,000; owner, Frank Davis; architect, C. Remington.

Mt. Moriah Station, Pa.—*Elmwood Ave. and Sixty-third St.*, several two and three-st'y brick and stone dwells.; owner, E. T. Tobin; architects, Moses & King, 431 Walnut St., Philadelphia.

Newark, N. J.—*James St.*, three-st'y brick dwell.; cost, $8,000; owner, Charles H. McCann; architect, Charles P. Baldwin, Prudential Building.

New York, N. Y.—*Coleman Pl.*, n s, 125' e Ogden Ave., three-st'y stone and frame dwell., mansard shingle roof; cost, $4,850; owner, John F. Kaiser, 520 East Eighty-ninth St.; architect, E. C. Childs, 62 New St.

Webster Ave., s s, 173' n One Hundred and Seventy-fourth St., three-st'y stone and frame dwell., tin roof; cost, $4,000; owner, Patrick Keeley, One Hundred and Thirty-third St. and Railroad Ave.; architect, J. J. Vreeland, 711½ Tremont Ave.

Seventy-fifth St., s s, 120' e Fifth Ave., five-st'y brick dwell., mansard, copper and slate roof; cost, $28,000; owner, Henry R. Hoyt, 8 West Tenth St.; architect, Richard H. Hunt, 1 Madison Ave.

Park Ave., w s, 40' 5" s Sixty-sixth St., three-st'y brick dwell., tin roof; cost, $12,000; owner, Thomas J. McLaughlin, 10 West Eighty-second St.; architects, Thom & Wilson, 1267 Broadway.

Briggs Ave., e s, 245' n Southern Boulevard, three-st'y brick and frame dwell.; cost, $3,000; owner, Lizette Wallace, Webster Ave. and Bedford Park; architect, E. K. Bourne, 18 Broadway.

Tuiton Ave., w s, 160' n One Hundred and Sixty-first St., three-st'y brick and frame dwell., tin roof; cost, $4,600; owner, Herman F. Harns, 3421 Third Ave.; architect, Adolph Pfeiffer, 3068 Third Ave.

(*Houses Continued.*)

Grenada Pl., s s, 118' w Ernscliff Pl., three-st'y brick and frame dwell., shingle roof; cost, $3,000; owner, Maria G. Del Gaize, St. George Crescent Bedford Park; architect, Edgar K. Bourne, 18 Broadway.

Mott Ave., s w cor. One Hundred and Sixty-third St., three-st'y brick and frame dwell., tin roof; cost, $8,000; owner, Mary Hopkins, Mott Ave. and One Hundred and Thirty-eighth St.; architect, M. E. Pringle, William's Bridge.

St. Nicholas Ave., s w cor. One Hundred and Fifty-first St., 4 three-st'y brick dwells., mansard, slate and tin roofs; cost, $100,000; owner, Fred Schuck, 18 St. Nicholas Pl.; architect, Frank Wennernen, 204 East Eightieth St.

Monroe Ave., w s, 400' n Columbine Ave, 3 three-st'y brick and frame dwells., shingle roofs; cost, $3,000; owner, Thomas Welsh, Arthur Ave. and One Hundred and Eightieth St.; architects, Kerby & Co., 722 Tremont Ave.

Cambrelling Ave., e s, 105' n King's Bridge Road, three-st'y brick and frame dwell., tin roof; cost, $3,000; owner, Sophia Guggolz, 1305 Bathgate Ave.; architect, Wm. Guggolz, 2305 Bathgate Ave.

Forest Ave., e s, 100' s One Hundred and Sixty-seventh St., 5 three-st'y brick and frame dwells., tin roofs; cost, $19,000; owner and architect, John W. Decker, 841 First Ave.

East One Hundred and Twenty-second St., No. 435, five-st'y brick dwell., tin roof; cost, $23,000; owner, Jacob Bloom, 596 Broadway; architect, John C. Burne, 101 West Forty-second St.

One Hundred and Forty-eighth St., cor. Convent Ave., 6 brick, brownstone and limestone dwells.; cost, $84,000; owner, Annie C. Doyle, 206 West Ninety-sixth St.; architects, A. B. Ogden & Son, 1031 Madison Ave.

Seventy-fifth St., e Fifth Ave., five-st'y brick and limestone dwell.; cost, $28 000; owner, Henry R. Hoyt; architect, R. M. Hart, Metropolitan Life Insurance Building, Twenty-third St. and Madison Ave.

Overbrook, Pa.—*Sixty-third St.*, s Lancaster, St., 2 three-st'y dwells.; contractor, John H. Myres.

Pawtucket, R. I.—*Lake St.*, two-and-one-half-st'y frame dwell.; owner, Owen Finley.

Smith St., cor. Lincoln Ave., two-and-one-half-st'y frame dwell.; owner, Martin Darwin.

Baldwin St., cor. Hope St., three-st'y frame dwell.; owners, Jas. Bain and wife.

North Bend St., cor. Saunders St., two-and-one-half-st'y frame dwell.; owner Horace Wells.

Jefferson Ave., two-and-one-half-st'y frame dwell.; owner, P. F. McCarthy; architect, Albert H. Humes.

(*Continued on page 4.*)

[*See Alphabetical Index on page XV for Pagination.*]

Classified Advertisements.

[Advertisers can be indexed only under a single head free of charge].

Air Valves.
Hedge Bros., Boston, Mass.

Antinonnin.
W. H. Schieffelin & Co., New York, N. Y. (eow)

Annunciators.
W. R. Ostrander & Co., New York.

Architects.
Bailey & Truscott, Philadelphia, Pa (mon)

Architect's Materials.
Frost & Adams, Boston. (eow)

Architectural Sheet-Metal Ornamental Works.
W H Mullins, Salem, O.

Artificial Stone.
Wenn Pavement Co., New York, N. Y. (eow)

Asbestos Felt & Boiler Coverings.
H. W. Johns M'f'g Co., New York.

Asbestos Felts.
H. F. Watson Co, Erie, Pa.

Asbestos Paint.
H. W. Johns M'f'g Co., New York.

Asphalt.
Neuchatel Asphalte Co., New York.
New York Mastic Works, New York, N. Y.

Asphalt Roofing.
Warren Chemical & M'f'g Co., New York.

Basin Cocks.
Stebbins Mfg. Co., Brightwood, Mass. (eow)

Bath-Tub.
Fred. F. Bischoff & Co., Chicago, Ill. (mon)
Miller & Coates, New York.
J. L. Mott Iron Works, New York.

Bells.
Blake Bell Co., Boston, Mass.
U S Tubular Bell Co.

Blue Prints.
Spaulding & Moss, Boston, Mass. (eow)

Boilers.
Babcock & Wilcox Co., New York.
Randolph & Clowes, Waterbury, Conn.

Books and Journals.
Babcock & Wilcox Co., New York.
Century Co., New York, N. Y.
Wm. T. Comstock, New York.
Hessling & Spielmeyer, New York N. Y.
Ticknor & Co. Boston.

Brass Goods.
J. B. Shannon & Sons, Philadelphia. (mon)

Brick Ashlar.
Fiske, Homes & Co., Boston.

Brick (Colored).
Jarden Brick Co., Philadelphia, Pa.

Brick (Ornamental).
Fleming Cement & Brick Co., New York. (eow)
W. H. Gates, Boston, Mass. (eow)
Hydraulic Press Brick Co., St. Louis.
Peerless Brick Co., Philadelphia, Pa.
Waldo Bros., Boston.

Bronzework.
M. J. Power, New York.

Bronze and Brass Work.
Paul E. Cabaret, New York, N. Y.

Building Felt (Fire and Waterproof).
H. W. Johns M'f'g Co., New York.

Building Papers.
H. F. Watson Co., Erie, Pa.

Ceilings (Metal).
New York Metal Ceiling Co., New York, N. Y.
H. S. Northrop, New York, N. Y.
The Kinnear & Gager Co., Columbus, O. (eow)

Cement (Hydraulic).
F. O. Norton Cement Co., N. Y.

Cement.
Alsen's Cement Works, New York, N. Y. (eow)
Brooks, Shoobridge & Co., New York.
Fleming Cement & Brick Co., New York. (eow)
Johnson & Wilson, New York.
Lawrence Cement Co., New York, N. Y.
E. Thiele, New York, N. Y.

Chrome Steel Castings.
Chrome Steel Works, Brooklyn, N. Y. (eow)

Clay Shingles.
Clay Shingle Co., Indianapolis, Ind.

Conductors (Water).
W. Austin Obdyke & Co., Philadelphia.
Boston Spiral Tube Works Boston.
Seiderless Standing-Seam Conductor Co., Allegheny, Pa.

Conservatories. Lord & Burnham Co Irvington-on-Hudson, N. Y.

Consulting Engineer.
George Hill, New York, N. Y.

Contracting.
Flynt Building & Construction Co., Palmer, Mass.

Cordage.
Samson Cordage Works, Boston. (eow)

Creosote Stains.
S. Cabot, Boston, Mass.

Coverings. (Boiler & Pipe.)
H. W. Johns Mfg. Co., New York, N. Y.

Decorators.
L. Haberstroh & Son, Boston.
Donald McDonald, Boston.

Door Hangers.
Lane Bros. Poughkeepsie, N. Y.

Door-Knobs. J. Bardsley, New York, N. Y.

Drawing Ink.
Chas M. Higgins, Brooklyn, N. Y.

Drawing Instruments.
Theo. Alteneder & Sons, Philadelphia, Pa (eow)

Elevators, etc.
Crane Elevator Co., Chicago Ill.
Graves Elevator Co., Rochester, N. Y.
Volney W. Mason & Co., Providence, R. I.
Moore & Wyman, Boston.
Morse, Williams & Co., Philadelphia.
Otis Brothers & Co., New York.
Springfield Foundry Co., Springfield, Mass.
Standard Elevator Co., Chicago, Ill.
Whittier Machine Co., Boston.

Elevator Cars and Enclosures.
J. E. Bolles & Co. Detroit, Mich. (eow)

Engineering Help.
The Engineering Employment Bureau.

Fan (Ventilating).
Huyett & Smith Mfg. Co., Detroit, Mich.

Fireproof Building.
Henry Maurer, New York.
Pioneer Fireproof Construction Co., Chicago, Ill.

Fireproof Construction.
Guastavino Fireproof Construction Co., N. Y.

Fireproof Lathing.
Hayes Metallic Lathing, New York.

Floors (Hardwood).
The Interior Hardwood Co., Indianapolis, Ind.
Wood Mosaics Co., Rochester, N. Y. (eow)

Floors (Inlaid).
National Wood M'f'g Co., N. Y.

Gas-Machines.
Tirrell Gas-Machine Co., New York.

Gates.
Wm R. Pitt, New York, N. Y. (mon).

Glass (Bent).
M. A. Smith Newark, N. J. (mon)

Glass (Stained and Ornamental).
Maitland Armstrong & Co., New York.
Matthews Decorative Glass Co., New York.
Tiffany Glass & Decorating Co., New York.

Grates, etc.
J. S. Conover & Co., New York.
E. A. Jackson & Bro., New York, N. Y.
Wm. H. Jackson & Co., New York.

Hard Oil Finish.
Berry Bros., Detroit, Mich.

Hardware.
Burditt & Williams, Boston, Mass.

Hardware. (Art.)
Yale & Towne Mfg. Co., Stamford, Ct.

Harness Bracket.
Jas. J. Read, Boston. (mon)

Heating and Ventilating.
Smith & Anthony Stove Co., Boston.

Heating-Apparatus (Steam).
Gorton & Lidgerwood Co., New York. (eow)
N. Y. Central Iron Works Co., Geneva, N. Y.
Page Steam-heating Co. Norwich, Conn.
Richardson & Boynton Co., New York, N. Y.
H. B. Smith Co., New York.

Heliotype Process.
Heliotype Printing Co., Boston.

Hinges. (Spring).
Van Wagoner & Williams Co., Cleveland, Ohio.

Hot-Blast Apparatus.
Huyett & Smith Mfg. Co., Detroit, Mich.
B F. Sturtevant Co., Boston, Mass.

Hot-Water Heating.
Detroit Heating & Lighting Co., Detroit, Mich.
Gurney Hot-Water Heater Co., Boston, Mass.

Insulated Wire.
W R. Brixey, New York, N. Y (eow)
The Okonite Co., (Ltd.) New York, N. Y. (eow)

Insurance.
Continental Insurance Co., N. Y (eow)
Insurance Co. of North America, Phila.
New England Mutual Accident Association.

Iron-Work (Architectural)
Belmont Iron Works, Philadelphia, Pa. (eow)
Columbia Iron & Steel Co, Uniontown, Pa.
Cooper, Hewitt & Co., New York.
Jackson Architectural Iron Works, N. Y.
Passaic Rolling Mill Co., Paterson, N. J.
Phœnix Iron Co., Philadelphia.
Pittsburgh Architectural Iron Works, Pittsburgh, Pa.

Iron (Galvanized)
Apollo Iron & Steel Co., Pittsburgh, Pa.

Joist Hanger.
Duplex Hanger Co., Cleveland, O.

Laundry Machinery.
Oakley & Keating, New York.
Troy Laundry Machinery Co., Troy.

Lightning Protection.
American Lightning Protection Co.

Link-Belting.
Link Belt Engineering Co., Philadelphia, Pa.

Mail Chutes.
Cutler Manuf'g. Co., Rochester N. Y.

Mantels. Penrhyn Slate Co., New York.

Marble Mosaics.
Aeschlimann & Pellarin, New York.

Marble-Workers.
Batterson, See & Eisele, New York.
Robert C. Fisher & Co., New York.

Metal Lathing.
G. Hayes, New York.

Metal-Workers.
J. & R. Lamb, New York.

Metal-Work. (Wrought.)
Paul E. Cabaret, New York.
John Williams, New York.

Mineral Wool.
U. S. Mineral Wool Co., New York.

Mortar Colors.
Samuel H. French & Co., Philadelphia.

Oil Finish.
Berry Bros., Detroit, Mich. (eow)

Paint.
F. W. Devoe & Co., New York. (eow)
Joseph Dixon Crucible Co., Jersey City, N. J.
Harrison Bros & Co, Philadelphia, Pa.
H. W. Johns Mfg Co., New York.

Patent Lawyers.
Howson & Howson, Philadelphia. (eow)

Pens.
The Esterbrook Steel Pen Co., New York, N. Y. (mon)

Perspective Machine.
Shaw & Johnson, Tampa, Fla.

Photographs.
J. W. Taylor, Chicago, Ill.

Photographic Outfits.
E. & H. T. Anthony & Co., New York, N. Y.

Plumbers. T. H. Duggan, Boston.

Pumps (Steam).
H. R. Worthington New York and Boston.

Ranges.
I. A. Sheppard & Co., Philadelphia, Pa.

Reflectors.
I. P. Frink, New York.

Refrigerators.
Wickes Refrigerator Co., New York, N. Y.

Rolling-Shutter
J. G. Wilson, New York.

Roofers.
Berger Bros., Philadelphia, Pa.
John Farquhar's Sons, Boston.
James A. Miller & Bro., Chicago, Ill.

Roofing Materials.
Cortright Metal Roofing Co., Philadelphia, Pa.
Merchant & Co., Philadelphia, Pa. (eow)
James B. Scott & Co., Pittsburgh, Pa.
N. & G. Taylor Co., Philadelphia, Pa. (eow)
N. E. Felt Roofing Works Boston.
Thorn Shingle and Ornament Co., Phila., Pa.

Roofing Tiles.
Baltimore Roofing Tile Co., Baltimore, Md.
J. C. Ewart & Co. Akron, O.
W. H Gates, Boston, Mass. (eow)

Sanitary Supplies.
Haines, Jones & Cadbury Co., Philadelphia, Pa
Smith & Anthony Co., Boston.

Sash-Chains.
Smith & Egge M'f'g Co. Bridgeport Conn.

Sash Balance Pullman Sash Balance Co. (The), Rochester, N. Y.

Sash-Cord.
Samson Cordage Works Boston. (eow)

School of Architecture.
C Powell Karr, New York, N. Y. (eow)

Sheet-Metal Work.
J. S. Thorn, Philadelphia. (eow)

Shingles (Metal).
E. Van Noorden & Co., Boston.

Shingle-Stains. S. Cabot, Boston.
Dexter Bros., Boston.

Shutters.
Clark, Bunnet & Co. New York.

Sidewalk Lights.
T. H. Brooks & Co, Cleveland, Ohio. (mon)

Sinks.
Kilbourne & Jacobs Mfg. Co., Columbus, O.

Skylights, etc.
G. Bickelnoupt, New York.
E. Van Noorden, Boston.
Valle & Young, Baltimore, Md.

Slate.
Brownville Maine Slate Co., Worcester, Mass.
Penrhyn Slate Co., New York.

Stable Fittings.
J. J. Read, Boston. (mon)

Steam Pipe Covering.
Keasby & Mattison Co, Ambler, Pa.

Steel Lath. Central Expanded Metal Co., Pittsburgh, Pa. (eow)

Stone (Building)
Thos. S. Clarkson, Potsdam, N. Y.
J. P. Falt & Co., Springfield, Mass.
Potsdam Red Sandstone Co., Potsdam, N. Y.
G. P. Sherwood, New York.

Terra-Cotta.
Indianapolis Terra-Cotta Co., Brightwood, Ind.
New York Architectural Terra-Cotta Co., N. Y.
Perth Amboy Terra-Cotta Co.
The Northwestern Terra-Cotta Co. Chicago, Ill.

Terra-Cotta Lumber. Pittsburgh Terra-Cotta Lumber Co., Pittsburgh, Pa.

Traps.
F. E. Cudell, Cleveland, O. (eow)
Detroit Sanitary Supply Co.

Trap-Vent.
Dubois Mfg. Co., New York. (eow)

Valves and Packing.
Jenkins Bros., New York.

Varnish.
Murphy & Co., Newark, N. J.
James Nassau, Philadelphia, Pa.

Vault Lights.
Dauchy & Co., Chicago.

Vault Threshold.
G. S. Clark, Philadelphia, Pa. (quar.)

Ventilation.
Globe Ventilating Co., Troy, N. Y.
E. Van Noorden, Boston.

Wall Tie.
J. B. Prescott & Son, Webster, Mass (eow)

Water-Closet.
Fred Adee & Co., New York, N. Y. (eow)

Window-Line.
Samson Cordage Works, Boston. (eow)

Window-Screens.
Metallic Window-Screen Manuf. Co, Boston, Mass.

Wire Lathing, etc.
Clinton Wire Cloth Co. Clinton, Mass.
New Jersey Wire Cloth Co., Trenton, N. J.

Wood Carpet.
E. B. Moore & Co., Chicago, Ill. (eow)

Wood Filler.
Bridgeport Wood Finishing Co., New Milford, Conn.

BUILDING INTELLIGENCE.

(Houses Continued.)

Philadelphia, Pa. — *Chelten Ave.*, e Boyer St., 2 three-st'y dwells.; contractor, C. L. Johnson, 429 Chelten Ave.

Nineteenth St., n Tioga St., 6 three-st'y dwells.; owner, J. C. Miller, 2006 Ontario St.

Gaul St., s Clearfield St., 5 two-st'y dwells.; contractor, G. Koeck, Tulip and Somerset Sts.

Harrock St., w Wingohocking St., 2 two-st'y dwells.; contractor, Wm. Holloway, 3027 Balderson St.

Hancock St., n w Washington Lane, 4 two-st'y dwell.; owners, C. R. Kohl & Bros., 45 West Johnson St., Germantown.

Frankford Ave., s Arrott St., three-st'y dwell.; contractor, W. S. Roberts, 4921 Franklin St.

Georges St., w Fourth St., three-st'y dwell.; contractor, Jos. F. Keifer, 511 West Girard Ave.

Sedgeley St., n Montgomery Ave., 3 two-st'y dwells.; contractor, H. S. Warfield, 1807 North Twenty-second St.

Oxford St., e Thirty-second St., 12 three-st'y dwells.; owners, Pemberton & Co., Thirty-second St. and Columbia Ave.

McKean St., w Eleventh St., two-st'y dwell.; contractor, Wm. Smith, 1821 South Fifth St.

Nineteenth St., n Tioga St., 6 two-st'y brick dwells.; contractor, J. C. Miller.

Pittsburgh, Pa. — *Irwin Ave.*, 3 brick dwells.; architects, Longfellow, Alden & Harlowe.

Frankstown Ave., 6 dwells.; architect, W. H. Sims.

Schenley View, dwell.; owner, Mrs. Margaret Warnock.

Fifth Ave., dwell.; owner, H. J. Watkins.

Several dwells. will be built by F. G. Stiren and also a number by D. L. Dillinger.

Providence, R. I. — *Angell St.*, n s n Taber Ave., two-and-one-half-st'y frame dwell.; cost, $4,500; owner, Oliver H. J. Perry.

Melrose St., s e cor. Pacific St., two-and-one-half-st'y frame dwell.; cost, $5,000; owner, Almena I. Kern; architect, E. I. Nickerson; builder, Joseph A. Wells.

Felix St., w s, n Chalkstone Ave., two-and-one-half-st'y frame dwell.; owner, H. F. Horton; day-work.

Seabright, N. J. – Dwell.; cost, $7,000; owner, Annie M. Victor; contractor, Wm. M. Pearsall.

Sewickley, Pa. — Dwells. will be built by Mrs. Frederick Fleming and Edward O'Neil.

Swedesboro, N. J. — Dwell.; owner, Miss Kate Gaskill.

Singlestown, Pa. — Dwell. will be built by Martin Kaylor.

Somerville, Mass. — *Central St.*, cor. Albion St., frame dwell.; owner, E. N. Everett; builder, George E. Hutchinson.

Kenwood St., frame dwell.; owner and builder, Harry E. Gould.

Broadway, frame dwell.; owner and builder, Harry E. Gould.

Porter St., frame dwell.; owner and builder, W. L. Glidden.

St. Louis, Mo. — Two-st'y dwell., e s Arlington St.,

BUILDING INTELLIGENCE.

(Houses Continued.)

bet. North Market and Theodosia Sts.; cost, $3,000; owner, Hy. Graf; contractor, Ernest Broecker.

Two-and-one-half-st'y dwell., e s Nebraska St., bet. Meremac and Chanton Sts.; cost, $7,000; owner, Jacob Albrecht; contractor, B. Koersters.

Uniontown, Pa. — Brick dwell.; owner, Frank Fuller.

Wilkinsburg, Pa. — Dwell.; architect, A. E. Linkenheimer, Pittsburgh, Pa.

Worcester, Mass. — *Ingleside Ave.*, one-and-one-half-st'y frame dwell.; owner, Bruno Trombly; contractor, J. A. Courtemanche.

Endicott St., three-st'y frame dwell.; owner, Jeremiah Hennessy; contractor, Geo. C. Reidy.

Randall St., one-and-one-half-st'y frame dwell.; owner, William Filbrook; contractor, E. B. Rogers.

Columbus St., two-st'y frame dwell.; owner, Isa May Smith; day-work.

OFFICE-BUILDINGS.

Philadelphia, Pa. — *Fifteenth St.*, seven-st'y office-building; cost, $125,000; Civil Engineer Zeigler is in charge of the work.

Providence, R. I. — *Page St.*, cor. Weybosset St., brick office-building; cost, $22,000; contractor, L. A. Tillinghast.

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BUILDING INTELLIGENCE.

PUBLIC BUILDINGS.

Baltimore, Md. — The new Maryland Penitentiary will be situated on Forest, Eager and Concord Sts.; cost, $1,500,000; architect, Jackson C. Gott.

Brazoria, Tex. — Court-house to cost $75,000 is contemplated.

Canton, Tex. — Jail to cost $20,000 will be built.

Chesterfield, S. C. — Jail to cost $10,000 will be built.

Mt. Vernon, Ga. — Court-house to cost $20,000 will be built.

Valdosta, Ga. — Court-house to cost $15,000 will be built.

SCHOOL-HOUSES.

Bridgeville, Pa. — Plans for a public school by J. E. Allison, architect, Penn Building, Pittsburgh, Pa.

Camden, N. J. — *Liberty Park*, school-house; cost, $10,950; contractor, Chas. Wrifford.

Clinton, Iowa. — School-house; cost, $10,500; address E. E. Forbes, City Clerk.

Morrisville, Pa. — School-house is being built.

Mount Carbon, Pa. — School-house to be built.

Scotland, Pa. — State Industrial School; $150,000 has been appropriated for the purpose.